MASS. H1.2: R76/draft ✓

REPORT

Environmental Assessment

Draft Supplemental Environmental Impact Report

EOEA No. 915

UMASS/AMHERST

312066016900347

ROUTE 57 RELOCATION PROJECT

PHASE II

AGAWAM / SOUTHWICK, MASSACHUSETTS

GOVERNMENT DOCUMENTS
COLLECTION
JUL 29 1993
University of Massachusetts

U.S. Department of Transportation
Federal Highway Administration
Massachusetts Highway Department
Boston, Massachusetts

Cooperating Agencies
U.S. Army Corps of Engineers
U.S. Environmental Protection Agency
U.S. Fish and Wildlife Service

April, 1993

REPORT

Environmental Assessment

Draft Supplemental Environmental Impact Report

EOEA No. 915

ROUTE 57 RELOCATION PROJECT

PHASE II

AGAWAM / SOUTHWICK, MASSACHUSETTS

U.S. Department of Transportation
Federal Highway Administration
Massachusetts Highway Department
Boston, Massachusetts

Cooperating Agencies
U.S. Army Corps of Engineers
U.S. Environmental Protection Agency
U.S. Fish and Wildlife Service

April, 1993

DRAFT ENVIRONMENTAL ASSESSMENT
SUPPLEMENTAL ENVIRONMENTAL IMPACT REPORT

RELOCATION OF ROUTE 57
AGAWAM - SOUTHWICK, MASSACHUSETTS

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

MASSACHUSETTS HIGHWAY DEPARTMENT

SUBMITTED PURSUANT TO 42 U.S.C. 4332(2)(c)

Apr 6, 1993
Date

Division Administrator
Federal Highway Administration

For additional information please contact:

State

Mr. Thomas Hession
Environmental Section
Massachusetts Highway Department
Transportation Building
10 Park Plaza
Boston, Massachusetts 02116
(617) 973-7498

Federal

Mr. Arthur O'Connor
Area Engineer
Federal Highway Administration
Transportation Systems Center
10th Floor
55 Broadway
Cambridge, Massachusetts 02142
(617) 494-2528

Comments on this Environmental Assessment are due by _____ and should be sent to Donald E. Hammer, Division Administrator, FHWA, 55 Broadway, 10th Floor, Cambridge, MA 02142, and to Michael W. Swanson, Chief Engineer, MHD, 10 Park Plaza, Boston, MA 02116.

TABLE OF CONTENTS

Page Number

TITLE SHEET

COVER SHEET

TABLE OF CONTENTS i

LIST OF TABLES iv

LIST OF FIGURES vi

SUMMARY vii

Certificates of the Secretary of EOEA and Related Documentation xvi

SECTION I - PURPOSE AND NEED

A. Background 1
B. Project Need 2
C. Purpose 3

SECTION II - ALTERNATIVES

A. Current Alternatives 5
B. Dismissed Alternatives 9
C. Preliminary Full Relocation Alternatives 15

SECTION III - TRAFFIC

A. Methodology 17
B. Traffic Volumes 17
C. Updated Traffic Counts 18
D. Level of Service 21
E. Construction Impacts 28

SECTION IV - AFFECTED ENVIRONMENT

A. Topography 29
B. Water Quality 29
C. Floodplains 35
D. Wetlands 35
E. Wildlife 41
F. Land Use and Socioeconomic 43
G. Relocation 44
H. Farmlands 44
I. Special or Hazardous Wastes 46
J. Air Quality 48
K. Noise 57
L. Historical and Archaeological 62
M. Area Wide Environment 63

Page
Number

SECTION V - ENVIRONMENTAL IMPACTS

A. Topography 65
B. Water Quality 65
C. Floodplains 68
D. Wetlands 71
E. Wildlife 92
F. Land Use and Socioeconomic 93
G. Relocation 95
H. Farmlands 99
I. Special or Hazardous Wastes 101
J. Air Quality 103
K. Noise 113
L. Historical and Archaeological 117
M. Secondary Impacts 117

SECTION VI - MITIGATING MEASURES

A. General 119
B. Highway Design Standards 119
C. Traffic Maintenance/Construction Controls 119
D. Soil Erosion and Sedimentation 120
E. Water Quality 120
F. Floodplain Management 121
G. Wetlands 121
H. Land Use and Socioeconomic 129
I. Relocation 129
J. Farmlands 129
K. Air Quality 129
L. Noise 130

SECTION VII - LIST OF PREPARERS 133

SECTION VIII - CIRCULATION 135

TECHNICAL APPENDICES

Appendix 1 - Wetlands

Section A	Summary of Wetland Delineation Methodology
	Wetland Delineation Transect Maps (Alt. III & IV)
Section B	Review of Wetland Information
	Surficial Geology Map
	National Wetland Inventory Map
Section C	Wetland Descriptions and Classifications
Section D	Criteria and Standards of MA Wetland Protection Act
Section E	References
Section F	MA National Heritage Program Correspondence
Section G	USACE Correspondence

Appendix 2 - Soils

Section A	Soils Descriptions
	Soil Identification Map

Appendix 3 - Air Quality

Section A	Calculation of Motor Vehicle Mesoscale Emission Rates (MOBILE4.1 Model Output)
Section B	Calculation of Motor Vehicle Microscale Emission Rates (MOBILE4.1 Model Output)
Section C	Mesoscale Traffic Data and Worksheets
Section D	Microscale Carbon Monoxide Results (Sample CAL3QHC Model Output)
Section E	Correspondence with DEP Division of Air Quality Control
Section F	Air Quality Receptors

Appendix 4 - Noise

Section A	Summary of Traffic Noise Model Input Parameters
Section B	Noise Barrier Analysis Summary
Section C	Sound Level Monitoring Systems

Appendix 5 - Farmlands

Appendix 6 - Historical and Archaeological

SUPPLEMENTAL DATA (Separate Volumes)

Traffic
Wetlands
Air Quality

LIST OF TABLES

Table		Page Number
S-1	Summary of Impacts and Mitigation	xv
I-1	Intersection Level of Service Southwick St. & South Westfield St.	2
II-1	Summary of Full Relocation Alternatives	15
III-1	Traffic Volume Summary	19
III-2	Intersection Level of Service Summary Existing Conditions	22
III-3	Intersection Level of Service Summary Alternatives I, III, III(a), IV and IV(a)	27
IV-1	Surface Water Quality Sample Results	31 - 34
IV-2	Overview of the Relationships Between Wetland Interests and Functions	40
IV-3	Housing Market Analysis	44
IV-4	Assumed Method of Traffic Control Used in Air Quality Analysis	50
IV-5	National and State Ambient Air Quality Standards	51
IV-6	Microscale Analysis Air Quality Receptor List	54
IV-7	Measured and Estimated Sound Levels at Study Locations	61
V-1	Common Highway Runoff Constituents and Their Primary Sources	66
V-2	Summary of Floodplain Fill Areas	69
V-3	Federally Defined Wetland Areas Impacted	76
V-4	Resource Areas Impacted Within Right-of-Way Massachusetts Wetland Protection Act (MWPA)	79
V-5	Summary of Resource Areas Impacted & Proposed Replacement Areas (MWPA)	89
V-6	Summary of Primary Land Use Impacts	93
V-7	Right of Way Impacts	95
V-8	Anticipated Relocations - Alternatives III & III(a)	96
V-9	Anticipated Relocations - Alternatives IV & IV(a)	97

LIST OF TABLES
(Continued)

Table		Page Number
V-10	Farmland Converted to Right of Way	99
V-11	Farmland Converted Indirectly to Non-Farmable	99
V-12	1988, 1993, and 2013 Alternatives I, III, III(a), IV and IV(a) Mesoscale Emissions	105
V-13	Predicted Maximum 1-Hour CO Concentrations at Sensitive Receptors Plus Background	108/109
V-14	Predicted Maximum 8-Hour CO Concentrations at Sensitive Receptors Plus Background	110/111
V-15	FHWA Traffic Noise Abatement Criteria	114
V-16	Peak Hour Measured and Estimated Hourly Equivalent Sound Levels	115
V-17	Estimated Average Travel Times for 2013 Through Traffic	117
VI-1	Comparison of Wetlands Filled and Replaced under Federal and MA Definitions	121
VI-2	Summary of Wetland Mitigation Areas	124
VI-3	Summary of Resources Impacted & Proposed Replacement Areas (MWPA)	126
VI-4	Highway Noise Barrier at Hendom Heights Subdivision	131

LIST OF FIGURES

Figure		After Page Number
I-1	Regional Map	2
I-2	Locus Map	2
I-3	Route 57 Relocation Project, Phase I & II	2
II-1	Alternative Alignments	8
II-2	Profiles	8
II-3	Typical Roadway Sections	8
II-4	Upgrade Existing Route 57 Alternative	16
II-5	Dismissed Alternatives	16
II-6	Preliminary Full Relocation Alternatives	16
III-1	1988 Existing Conditions Traffic Volumes	20
III-2	1993 Traffic Volumes - No Build Alternative I	20
III-3	2013 Traffic Volumes - No Build, Alternative I	20
III-4	1993 Traffic Volumes - Alternatives III and IV	20
III-5	1993 Traffic Volumes - Alternatives III(a) & IV(a)	20
III-6	2013 Traffic Volumes - Alternatives III & IV	20
III-7	2013 Traffic Volumes - Alternatives III(a) & IV(a)	20
IV-1	Surface Water Sampling Locations	30
IV-2	Existing Wetland Resources	38
IV-3	Loudness Ratio and Decibel Scale (dBA) for Common Sounds	58
V-1	Floodplain Encroachments	70
V-2	Wetland Impact Areas	76
V-3/V-8	Relocation Vicinity Southwick Town Line and South West St. - Alt. III, III(a), IV & IV(a)	98
V-9	Farmland Areas Affected	102
V-10	Air Quality Receptor Locations	112
V-11	Noise Analysis Locations	116
VI-1	Conceptual Wetland Replacement Areas	128

SUMMARY

A. PROJECT DESCRIPTION

The proposed project involves the reconstruction of Route 57 in Agawam and Southwick on a new alignment extending from the South Westfield Street, northwesterly for approximately 2.2 miles to existing Route 57 near the Agawam/Southwick Town line at Provin Mountain. Relocated Route 57 will be constructed as a four lane limited access divided highway roughly paralleling existing Route 57 between South Westfield and South West Streets. Near South West Street, Relocated Route 57 will transition to an undivided rural highway, with one travel lane in each direction and a climbing lane for westbound trucks. A full diamond interchange will be provided by adding two access ramps and a bridge to carry South Westfield Street over Relocated Route 57. An at-grade signalized intersection may be constructed at South West Street. Alternatives have been developed which provide a grade separation at South West Street, but do not allow access to and egress from Relocated Route 57.

B. PURPOSE AND NEED

Existing Route 57, Southwick Street, has serious traffic safety and operational problems caused by numerous substandard roadway elements in combination with the heavy traffic which uses this roadway. Accordingly, the "*...purpose of the project is to resolve long standing safety and capacity deficiencies, in traffic operations and access, on existing Route 57 in Agawam, Massachusetts and to provide increased traffic capacity while moving traffic along an east-west corridor.*"[1]

C. BACKGROUND

The Massachusetts Highway Department (MHD), formerly the Massachusetts Department of Public Works (MDPW), initiated improvements to the Route 57 corridor in 1959 when Route 57 was extended as a 6 lane limited access divided highway from US Route 5 to Main Street (Route 159) in the Town of Agawam. Later extensions in 1960 and 1962, extended the road as a four lane limited access divided highway to Suffield Street (Route 75) in Agawam.

In 1971, a corridor study recommended a limited access highway extending from Suffield Street in Agawam to Hillside Road in Southwick. In response to local opposition, MHD dropped plans for the limited access highway segment in Southwick. In 1974, a new corridor study recommended that a Partial Relocation Alternative be further evaluated. This involved relocation of Route 57 as a limited access roadway in Agawam and spot safety improvements in Southwick. A Federal Environmental Assessment (EA) and a Massachusetts Environmental Impact Report (EIR), EOEA No. 915, were prepared for this alternative. The Federal Highway Administration (FHWA) issued a Negative Declaration and the Executive Office of Environmental Affairs (EOEA) issued a Certificate on the Final EIR in 1979. In 1985, the project had advanced to final design when U.S. EPA requested additional studies in order to better protect the wetlands bordering Leonard Pond.

[1] William F. Lawless, P.E., Chief, Regulatory Division, Operations Director, "Letter to Mr. George Turner, Jr., Chief Engineer, Massachusetts Department of Public Works (now MHD)", October 3, 1990.

In response to these concerns about impacts on wetlands, MHD subdivided the proposed project into Phase I and Phase II and notified EOEA of a "Project Change" on August 7, 1987. The EOEA Secretary issued a Certificate establishing the "Scope" for Supplemental Environmental Impact Reports (SEIR) for Phase I and Phase II on February 12, 1988 . The Draft and Final SEIRs have previously been completed for Phase I. Delays involving permits and other matters have delayed preparation of the Draft SEIR for Phase II until now.

D. ALTERNATIVES

Alternative II was designated as the "Preferred Alternative" in the 1979 Negative Declaration. It involved substantial wetland filling, including the wetlands bordering Leonard Pond and is no longer under consideration by MHD.

In addition to the No-Build Case (Alternative I), two build alternatives are currently under consideration. They are further described in Section II and consist of the following:

Alternative III	-	At-Grade Intersection at South West Street
Alternative III(a)	-	Grade Separation at South West Street
Alternative IV	-	At-Grade Intersection at South West Street
Alternative IV(a)	-	Grade Separation at South West Street

Alternatives III and IV both lie substantially to the north of Alternative II, farther away from Leonard Pond and its contiguous wetlands. Both Alternatives involve reconstructing Route 57 as a four lane limited access divided highway roughly paralleling existing Route 57 between South Westfield and South West Streets. Both will transition to an undivided rural highway in the vicinity of South West Street.

The safety and traffic congestion problems on existing Route 57 are caused by substandard roadway elements including: numerous curb cuts, narrow travel lanes, poor sight distance, inadequate signalization, undefined shoulders, lack of a truck climbing lane approaching Provin Mountain, variable speed zones, and conflicts between local and through traffic. Both Alternatives III and IV effectively address these operational and safety deficiencies. By diverting through trips to the new roadway, operations and safety will also be enhanced on existing Route 57 and on the local streets now being used to bypass Southwick Street.

The following alternatives were developed after 1988, but have been discarded and are no longer being considered for implementation:

Upgrade Existing Route 57 Alternative
Alternative II
Alternative V
Alternative V(a)

The Upgrade Existing Route 57 Alternative would involve reconstructing South Westfield Street and Southwick Street (Existing Route 57) as four lane highways. Local and through traffic would be mixed, causing many safety problems. The proposed widening would require taking a 7 to 11 foot wide strip of land from properties along Southwick and South Westfield Streets. This would destroy the remaining rural character of these streets, adversely affect residential quality, and segment neighborhoods. Relocation of 9 businesses and 11 dwelling units and partial acquisition of an old cemetery on Southwick Street would be required.

Alternative II would pass close to Leonard Pond and impact wetlands and wildlife.

Alternative V would incorporate a segment of South Westfield Street as part of its alignment. Using a segment of a local street as to link two sections of limited access highway would cause significant safety problems. Alternative V would bisect and segment Pheasant Hill Village, a "Section 8" subsidized housing for low income families and the elderly. Relocation of 3 businesses, 86 dwelling units, a church and a partial taking of an old cemetery on South Westfield Street would be required. The alignment of Alternative V(a) is comparable to Alternative V. It utilizes a local street in Pheasant Hill Village as part of its alignment which would cause significant safety problems.

E. TRAFFIC

Under existing conditions, the intersection of South Westfield Street and Southwick Street operates at Level of Service C during the AM Peak Hour and at Level-of-Service F during the PM Peak Hour. Intersection improvements under the Phase I Project will address this capacity problem in the near term, however, increases in background traffic will cause operations to again deteriorate. Under the No Build Alternative, the intersection will operate at a Level-of-Service F during the AM and PM Peak Hours, by 2013. The westbound approach of Shoemaker Lane to its intersection with South Westfield Street operates at Level-of-Service D during the AM Peak Hour and at F during the PM Peak Hour. By 2013 under the No Build Alternative, increases in background traffic will cause operations to deteriorate until the approach operates at Level-of-Service F during both the AM and PM Peak Hours. Provision of traffic signal control would only upgrade 2013 PM Peak Hour operations to Level-of-Service E.

Upon implementation of either Alternative III or Alternative IV, much of the through traffic now using Southwick and South Westfield Streets will be diverted to the new Relocated Route 57. This will upgrade traffic operations along South Westfield and Southwick Streets. It will also improve traffic safety by reducing the mixing of through and local traffic on a single roadway.

Comparing traffic operations in 2013 under the No-Build Alternative with operations under Alternatives III, IIIa, IV, and IVa, the AM and PM Peak Hour Levels-of-Service at the Southwick and South Westfield Streets intersection will improve from F to B. Upon provision of traffic signal control, the AM and PM Peak Hour Levels-of-Service at the Shoemaker Lane and South Westfield Street intersection would improve from F to B. Traffic volumes on South Westfield and Southwick Streets will be slightly greater under Alternatives III(a) or IV(a) with grade separation than under Alternatives III and IV, but Levels-of-Service will be comparable, and in certain locations, somewhat lower.

Under Alternative III, it is expected that approximately 56 truck loads per work day will be required for an 18 month period to complete off-site disposal of excess excavated material. Under Alternative IV, 21 truck loads per work day would be required for 18 months. The truck traffic would have a short term adverse impact on the roads and intersections during construction.

F. ENVIRONMENTAL IMPACTS

1. Topography

The proposed project will require deep excavations in the vicinity of Provin Mountain and South Westfield Street. Approximately 440,000 and 160,000 cu. yds. of excess material will require disposal within the right-of-way or off-site under Alternatives III and IV, respectively. These short term adverse impacts are not considered to be significant.

2. Water Quality

Both build alternatives will affect surface water quality by adding contaminants typically found in urban stormwater including: particulates, heavy metals, chloride, and petroleum products. Contaminant loading is affected by the area of pavement and the volume of traffic and is comparable for Alternatives III and IV. Because the runoff from the proposed roadway constitutes a small percentage of the total runoff affecting Leonard Pond or Still Brook, these adverse impacts are not considered to be significant.

Sedimentation and erosion will increase during construction. Erosion control measures are included in all MHD construction contracts. In addition, erosion controls will be required by the local Conservation Commissions and the Department of Environmental Protection under their Orders of Conditions and by the Corps of Engineers under their 404 Permit. Accordingly, soil loss will be minimized and these adverse effects are not considered to be significant.

3. Floodplains

Highway projects may potentially affect flooding as follows: 1) by placing fill within floodplains reducing their flood storage volume, 2) by adding impervious surfaces which increases stormwater runoff, and 3) by placing embankments which constricts flows and inundates upstream areas. There are two types of floodplains in the Project Area, i.e. floodplains delineated by the Flood Insurance Administration (FIA) of the Federal Emergency Management Agency which are protected under Executive Order (E.O.) 11988 and floodplains determined by hydrologic analysis which are protected under the Massachusetts Wetlands Protection Act.

Alternatives III and IV will involve the filling of approximately 0.18 acres of the FIA delineated floodplain which lies along Still Brook. Alternatives III and IV also require filling of approximately 0.85 and 1.43 acres, respectively of the calculated 100 year floodplain at stream crossings.

The performance standard established under E.O. 11988 and under the Massachusetts Wetlands Protection Act require that lost flood storage be replaced by excavating a compensatory flood storage area of equivalent volume along the same reach of the water course. In addition, DEP Regulations require that the compensatory flood storage be equivalent at each increment of elevation up to and including the level of inundation of the 100 year storm. Compensatory flood storage will be provided in the replacement wetlands. The area of wetland/flood storage proposed for construction is 11.2 to 12.0 acres which is substantially larger than the 0.85 to 1.43 acres of calculated floodplain plus the 0.18 acres of FIA floodplain proposed to be filled.

During final design, drainage cross culverts and detention facilities will be designed to attenuate the increase on the peak rate of discharge while alleviating flooding outside of the right-of-way. Their design will be subject to regulation as part of issuance of a 404 Permit and the Orders of Conditions.

Accordingly, any adverse flooding effects are not considered to be significant.

4. Wetlands

The filling of wetlands necessary to construct the proposed project will require a permit from the United States Army, Corps of Engineers (USACE) under Section 404 of the Federal Clean Water Act. Permits for highways are processed under the three step USACE Highway Methodology. The alternatives and mitigating measures developed under the USACE Highway Methodology are incorporated as part of this Supplemental Environmental Impact Report (SEIR). The Purpose and Need Process (Step 1) of the USACE Highway Methodology was completed on October 3, 1990, when the Corps of Engineers established the Purpose of the Project.[1] Phase I - Avoidance (Step 2) of the USACE Highway Methodology which seeks to avoid wetland loss through systematic analysis of practicable alternatives was completed in 1992, when the Corps determined that Alternatives III/III(a) and IV/IV(a) should be carried forward.[2] Phase II (Step 3) of the process, encompasses more detailed analysis of alternatives and culminates with selection of the Least Environmentally Damaging Practicable Alternative (LEDPA) by the Corps. The formal USACE Permit Application will be submitted, and a joint USACE/MHD public hearing will be held. Following selection of the LEDPA, minimization will be evaluated in an effort to reduce the loss of wetlands. Loss of wetlands is unavoidable. Compensation will focus on construction of replicated wetlands. The feasibility of constructing the conceptual replacement wetlands indicated in this Draft SEIR will be further evaluated.

Wetland resources in the project area have been delineated using both Massachusetts and Federal requirements. The wetlands between South West Street and the Southwick Town Line are of particular concern because they are tributary to Leonard Pond, a scenic and pristine water body. These wetlands have been considered for protection under Section 404(c) of the Federal Clean Water Act. Plans for formal delineation of a 404(c) area within the project area are under evaluation.

Under the Federal definition, approximately 9.2 acres of wetland will be filled under Alternative III and approximately 10.3 acres will be filled under Alternative IV. Alternative III crosses Wetland Nos. 4, 5, 6, and 7 and Alternative IV crosses Wetland No. 7 which are within the potential 404(c) protection area. Bridges or culverts will be used to minimize or eliminate filling of these 404(c) wetlands under all Build Alternatives.

To mitigate the loss of wetlands, conceptual plans for replacement wetland areas have been prepared as part of the USACE Highway Methodology. The area of the replacement exceeds the area of the wetlands filled, satisfying the principle of no net loss of wetlands. The

[1] William F. Lawless, P.E., October 3, 1990, op. cit.
[2] William F. Lawless, P.E., Chief, Regulatory Division, Operations Director, "Letter to Frank Bracaglia, Deputy Chief Engineer, Project Development, Massachusetts Highway Department, May 15, 1992.

functions and values of the replacement wetlands are comparable to the wetlands filled. Wetland replication areas A, B, C, and F containing a total of 12.0 acres will compensate for the loss of 9.2 acres of wetland under Alternative III. Wetland replication areas A, D, E, and F containing a total of 11.2 acres will compensate for the loss of 10.3 acres of wetland under Alternative IV.

5. Wildlife

Construction of either build alternative will affect existing wildlife habitat. Alternative III will cause minor impacts on wildlife because most of the habitat lost is cultivated fields which are of lower value and because it does not bisect a large contiguous open space area. Alternative IV will cause the least impact on wildlife because it isolates the smallest area of continuous open area and because the habitat lost consists of cultivated fields which lie in close proximity to the existing developed areas. Based upon the above and upon the fact that no rare species or species of concern are known to inhabit the project area, adverse impacts on wildlife caused by implementation of either build alternative are not considered to be significant.

6. Land Use and Socioeconomic

The proposed project is not expected to cause any area wide impacts on land use. The new roadway will decrease travel time through the project area, however, this decrease is not sufficient to cause changes in land use or development patterns. Because the new roadway will be limited access, no new roadway frontage will be created to stimulate development.

7. Relocation

Construction of Alternative III will necessitate the relocation of 5 occupied residences and 3 farms (classified as "business" relocations). Alternative IV will require relocation of 10 occupied residences and 3 farms. Construction of Alternatives III(a) or IV(a) provides for a proposed grade separation at the intersection of South West Street and Relocated Route 57. Raising the grade of South West Street requires the relocation of 12 additional residences under Alternative III(a), and the relocation of 8 additional residences under Alternative IV(a).

Preliminary information indicates that a number of moderately priced housing units are available in the area. Based on availability of moderately priced replacement housing, the adverse relocation impacts of constructing either build alternative are not considered to be significant.

8. Farmlands

Alternatives III and IV will both impact three farms. Alternative III will involve the acquisition of 61 acres of farmland for right of way of which 36 acres are actively farmed. An additional 53 acres will be converted indirectly because construction of the roadway severs access or creates uneconomic remnants of land. Alternative IV will involve the acquisition of 60 acres of land for right-of-way of which 40 acres are farmed. An additional 33 acres will be converted indirectly (access denied and uneconomic remnants). Both alternatives have nearly identical impacts on the Tuckahoe and Schmaelzle farms because the their alignments are similar as they pass through these farms. Alternative IV causes less impact on the Boglisch farm, because it skirts the north edge of the farm. Alternative III passes through the center of the Boglisch farm, severing 18 acres from the remainder of the farm.

9. Special or Hazardous Wastes

A search of available records does not indicate probable hazardous waste locations within the right-of-way of either Alternative III or IV.

Municipal records indicate an oil tank was located at 364 South Westfield Street and no record of its removal is on file. A magnetometer survey of 364 South Westfield Street was performed in July of 1990 which indicated the potential location of five buried steel or iron objects. Follow-on excavation at the property failed to locate any buried tanks. No additional testing is considered necessary.

10. Air Quality

Mesoscale analysis indicates that emissions of Carbon Monoxide (CO) and Non-Methane Hydrocarbons (NMHC) will be less in 1993 and in 2013 under Alternative III or IV, than under either the No Build Alternative or under Existing Conditions. Alternative III will have slightly lower emissions of CO and NMHC than Alternative IV. Emissions from the new roadway will be more than offset by reductions in emissions along existing roadways.

Alternatives III(a) and IV(a) with grade separations at South West Street will increase mesoscale emissions. Mesoscale emissions of CO, NMHC, and Nox in 1993 and 2013 under Alternatives III(a) and IV(a) are higher than emissions for either the No Build Alternative or the comparable Alternatives III and IV. Mesoscale emissions of NMHC are lower than the 1988 Existing Case.

In both 1993 and 2013, all receptors are in compliance with National Ambient Air Quality Standards (NAAQS) 1 and 8 hour CO limits under Alternatives III, III(a), IV, and IV(a). Project wide in 1993, there is a decrease of 13% under Alternative III and 12% under Alternative IV in the 1 hour CO concentrations in comparison to the No Build case. For 1993 8 hour CO concentrations, decreases of 9% under Alternative III and 11% under Alternative IV occur in comparison to those occurring under the No Build Case. In the 2013 build cases, there are project wide decreases of 10% under Alternative III and 9% under Alternative IV for 1 hour CO concentrations and decreases of 4% under both Alternative III and IV in comparison with concentrations occurring under the No Build Alternative. These decreases in CO in both 1993 and 2013 under Alternatives III and IV are due to shorter queue lengths and better traffic flow resulting from implementation of the Route 57 Relocation.

Evaluation of the grade separation Alternatives III(a) and IV(a) show no violations of the 1 and 8 hour NAAQS. With one exception, receptor concentrations at intersections increase in comparison to those occurring under Alternatives III and IV due to increased local circulation traffic.

Microscale analysis demonstrates that implementation of either Build Alternative will not interfere with attainment and maintenance of the NAAQS for CO. Implementation of either Build Alternative will cause the beneficial effects of decreasing CO concentrations at intersection experiencing decreased traffic volumes. Of the two principal Build Alternatives currently under consideration, Alternative III yields the best mesoscale and microscale air quality results.

Both build alternatives will generate fugitive dust during construction. Aeolean erosion will be controlled through practices such as wetting down work areas and covering loads during hauling. Therefore, these short term impacts from fugitive dust are not considered to be significant.

11. Noise

Under the No Build Alternative, residences at the intersection of South Westfield Street and Southwick Street will be exposed to noise in excess of the FHWA exterior noise standard of 67 DBA during peak traffic periods. Because either build alternatives will divert traffic to the new roadway and reduce traffic on existing Southwick Street, noise levels along existing Route 57 will decrease, abating this non attainment condition.

Implementation of either build alternative will increase noise levels along the new right of way. Alternatives III and IV will produce sound level increases of slightly more than 15 DBA at Locations 2 and 9 near the Hendom Heights subdivision unless mitigating measures are implemented. While these future sound levels do not exceed FHWA exterior noise standards, this increase would be considered significant. Construction of a noise barrier at Locations 2 and 9 was evaluated, however, its anticipated construction costs would be more than two times MHD guidelines to be considered a reasonable expenditure. Accordingly, construction of a noise barrier is not considered cost-effective and will not be provided.

12. Historical and Archaeological

No sites eligible for inclusion in the National Register of Historic Places have been identified within the rights of way of either build alternative. Accordingly, implementation of either Alternative III or IV will not cause any adverse effects on archaeological or historical resources.

13. Secondary Impacts

Land which will be acquired for the Route 57 Relocation right of way will diminish the tax base in Agawam and to a minimal extent in Southwick. The adverse secondary impact of decreased annual tax revenue to the Town of Agawam will be counterbalanced by ongoing growth of the area. Most of the agricultural lands that may be taken are already receiving tax reductions because the owners voluntarily placed development restrictions on their land under the APR and Chapter 61, 61a and 61b programs. Accordingly, the adverse secondary impact of decreased tax revenue to the Town of Agawam is not considered to be significant. In Southwick, takings for highway purposes will be limited to about 1 acre and one dwelling under Alternative III/III(a) and about 1 acre of vacant land under Alternative IV/IV(a). Due to the small size of the resulting loss of tax revenue, the adverse secondary impact of decreased tax revenue to the Town of Southwick is not considered to be significant.

Under either build alternative, the length of the through trip from South Westfield Street to west of the Agawam/Southwick Town Line is shortened, thus decreasing a total vehicle miles travelled (VMT). In addition, travel time for through traffic using the relocated highway under average conditions will be shortened and congestion and delays will be minimal. These decreases in VMT, travel time, and congestion/delays will serve to decrease energy consumption by vehicles in the project area.

14. Summary Table

Table S-1 provides a summary of impacts and mitigation for the Route 57 Relocation Project, Phase II.

TABLE S-1
SUMMARY OF IMPACTS AND MITIGATION FOR ROUTE 57 RELOCATION PROJECT

COMPONENT	EXISTING CONDITIONS & ALTERNATIVE I (NO BUILD)	ALTERNATIVE III	ALTERNATIVE III(a)	ALTERNATIVE IV	ALTERNATIVE IV(a)
24 HOUR VOLUME (EXISTING/1993/2013)					
SOUTHWICK ST. EAST OF SOUTH WEST ST.	13,800/14,800/20,800	NA/5,300/7,050	NA/6,000/8,000	NA/5,300/7,050	NA/6,000/8,000
RELOCATED ROUTE 57 EAST OF SOUTH WEST ST.	NA / NA / NA	NA/12,200/18,550	NA/11,000/17,500	NA/12,200/18,550	NA/11,000/17,500
PM PEAK HR LEVEL OF SERVICE (EXISTING/1993/2013)					
SOUTHWICK ST. AT SOUTH WEST STREET	B / B / C	NA / B / B	NA / B / B	NA / B / B	NA / B / B
SOUTHWICK ST. AT SOUTH WESTFIELD STREET	F / D / F	NA / B / B	NA / B / B	NA / B / B	NA / B / B
S.WESTFIELD ST.RAMPS - R.RTE.57 (SIGNALIZED)	NA / F / F	NA / B / B	NA / B / B	NA / B / B	NA / B / B
INTERSECTION S.WEST ST.- RELOCATED ROUTE 57	NA / NA / NA	NA / B / B	NA / NA / NA	NA / NA / NA	NA / NA / NA
CONSTRUCTION COST	NA	21 MILLION	22 MILLION	14 MILLION	15 MILLION
EXCESS EARTH TO BE HAULED	NA	440,000 CY	360,000 CY	160,000 CY	120,000 CY
SURFACE WATER QUALITY (LONG TERM/CONSTRUCTION)	NA/NA	MINOR/MINOR	MINOR/MINOR	MINOR/MINOR	MINOR/MINOR
FLOODPLAIN FILLED - FIA DELINEATED	NA	0.18 ACRES	0.18 ACRES	0.18 ACRES	0.18 ACRES
FLOODPLAIN FILLED - CALCULATED AT STREAMS	NA	0.85 ACRES	0.83 ACRES	1.43 ACRES	1.21 ACRES
TOTAL WETLAND FILLED					
FEDERAL DEFINITION [1]	NA	9.2 ACRES	9.0 ACRES	10.3 ACRES	9.9 ACRES
404(c) PROTECTED WETLAND [1]	NA	NONE	NONE	NONE	NONE
MASSACHUSETTS DEFINITION [1] [2]	NA	6.6 ACRES	6.4 ACRES	7.7 ACRES	7.3 ACRES
REPLACEMENT WETLANDS LOCATIONS	NA	A, B, C, AND F	A, B, C, AND F	A, D, E, AND F	A, D, E, AND F
REPLACEMENT WETLANDS - TOTAL AREA	NA	12.0 ACRES	12.0 ACRES	11.2 ACRES	11.2 ACRES
HABITAT - PREDOMINANT UPLAND HABITAT LOST	NA	VALUABLE WOODED & SHRUB COVERED	LOWER VALUE CULTIVATED FIELD	LOWER VALUE CULTIVATED FIELD	DEVELOPED AREAS & CULTIVATED FIELD
WILDLIFE	NA	MODERATE	MODERATE	MODERATE - LOW	MODERATE - LOW
FARMLAND CONVERTED DIRECTLY	NA	61 ACRES	61 ACRES	60 ACRES	60 ACRES
FARMLAND CONVERTED INDIRECTLY	NA	53 ACRES	53 ACRES	33 ACRES	33 ACRES
FARMLAND - IMPACTS ON BOGLISCH TREE FARM	NA	BISECT FARM IN TWO REMAINDER IS DIFFICULT TO FARM	BISECTS FARM IN TWO REMAINDER IS DIFFICULT TO FARM	TAKES LAND FROM N. EDGE REMAINDER IS FARMABLE	TAKES LAND FROM N. EDGE REMAINDER IS FARMABLE
RELOCATION - RESIDENTIAL PROPERTIES	NA	5 RESIDENCES	17 RESIDENCES	10 RESIDENCES	18 RESIDENCES
RELOCATION - BUSINESS PROPERTIES	NA	3 FARMS	3 FARMS	3 FARMS	3 FARMS
CO 1&8 HR NAAQS VIOLATIONS (EXIST/1993/2013)	NONE/NONE/NONE	NA/NONE/NONE	NA/NONE/NONE	NA/NONE/NONE	NA/NONE/NONE
NOISE LOC 5 SOUTHWICK ST.(EX/1993/2013 PEAK HR)	67 / 66 / 68 dBA	NA / 56 / 61 dBA	NA / 56 / 61 dBA	NA / 56 / 61 dBA	NA / 56 / 61 dBA
NOISE LOC 7 S WESTFIELD (EX/1993/2013 PEAK HR)	64 / 66 / 67 dBA	NA / 62 / 64 dBA	NA / 62 / 64 dBA	NA / 62 / 64 dBA	NA / 62 / 64 dBA
NOISE LOC 9 HENDOM DRIVE (EX/1993/2013 PEAK HR)	44 / 44 / 45 dBA	NA / 62 / 64 dBA	NA / 62 / 64 dBA	NA / 62 / 64 dBA	NA / 62 / 64 dBA
NOISE FHWA CRITERIA MAXIMUM	67 dBA	67 dBA	67 dBA	67 dBA	67 dBA
HISTORICAL AND ARCHEOLOGICAL RESOURCES	NA	NONE	NONE	NONE	NONE
DIRECT/SECONDARY DEVELOP. INDUCED IN CORRIDOR	NA	NONE	NONE	NONE	NONE

[1] ALTERNATIVES III AND III(a) INCLUDE BRIDGING WETLANDS NO. 4, 5, 6 AND 7. ALTERNATIVES IV AND IV (a) INCLUDE BRIDGING WETLAND NO. 7 ONLY.
[2] THE 2.6 ACRES OF FILL TO BE PLACED IN WETLAND NO. 15 IS PERMITTED BY THE ORDER OF CONDITIONS FOR THE PHASE I PROJECT AND IS NOT INCLUDED IN THE TOTAL FILL UNDER THE MASSACHUSETTS DEFINITION.

CERTIFICATES OF THE SECRETARY OF EOEA AND RELATED DOCUMENTATION

Copies of Certificates of the Secretary of the Executive Office of Environmental Affairs (EOEA) and related documentation pursuant to the Massachusetts Environmental Policy Act (M.G.L., c.30, ss.61 through 62H) are as follows:

1) Statement of the Secretary on Final Environmental Impact Report, dated February 15, 1979. (4 Pgs.)

2) Letter containing Notice of Project Change from Massachusetts Highway Department (MHD) to EOEA, dated August 7, 1987. (1 Pg.)

3) Certificate of the Secretary of EOEA on the Notice of Project Change, dated February 12, 1988. The Certificate determined the need for separate environmental review of the 2.6 mile long eastern and 2.2 mile long western portions of the Route 57 Relocation Project and establishes the SCOPE for this Draft Supplement Environmental Impact Report (Draft SEIR). (3 Pgs.)

4) Certificate of the Secretary of EOEA on the Draft Supplementary Traffic and Wetlands Analysis for Phase I of the Route 57 Relocation Project, dated February 17, 1989. (3 Pgs.)

5) Certificate of the Secretary of EOEA on the Final Supplementary Traffic and Wetlands Analysis for Phase I of the Route 57 Relocation Project, dated August 2, 1992. (3 Pgs.)

6) Letter containing intention to submit traffic study for Project Change (removal of westbound frontage road between Suffield Street and Mill Street) from MHD to EOEA, dated February 6, 1992. (2 Pgs.)

7) Letter containing concurrence to file traffic study as a Supplement to Final Supplemental Traffic and Wetlands Analysis from EOEA to MHD, dated February 11, 1992. (1 Pg.)

8) Letter containing approval of Supplement to Final Supplemental Traffic and Wetlands Analysis (EOEA #915) from EOEA to MHD, dated May 14, 1992. (2 Pgs.)

The Commonwealth of Massachusetts
Executive Office of Environmental Affairs
100 Cambridge Street
Boston, Massachusetts 02202

EDWARD J. KING
GOVERNOR
JOHN A. BEWICK
SECRETARY

STATEMENT OF THE SECRETARY

ON

FINAL ENVIRONMENTAL IMPACT REPORT

The Secretary of Environmental Affairs herein issues a statement that the Final Environmental Impact Report submitted on the below-referenced project does adequately and properly comply with the Massachusetts General Laws, Chapter 30, Section 62 and the regulations governing the preparation of environmental impact reports, subject to the conditions outlined below.

ENVIRONMENTAL AFFAIRS FILE NO. #00915

SUBMITTED BY: Department of Public Works

DATE RECEIVED: February 15, 1979

PROJECT IDENTIFICATION: TRANSPORTATION IMPROVEMENTS TO ROUTE 57, Southwick - Agawam

TRAFFIC-RELATED ISSUES

It is apparent from comments that many Agawam residents believe a relocated Route 57 to be the best method to relieve the intense traffic and safety concerns along existing Mill Street (Route 57). However, several parties have highlighted potential traffic impacts which go beyond strictly local Agawam concerns. The primary focus has been the South End Bridge:

* In his letter of January 12, 1979, Mayor DiMauro of Springfield referred to traffic congestion impacts of relocated Route 57 affecting both ends of the South End Bridge. He also requested expeditious state studies of the traffic situation at the bridge.
* The Forest Park East Civic Association, in the March 13, 1979, letter of Association President Edward Cass, contends that "The road development will cause a serious problem on Springfield's South End Bridge, which cannot sustain the traffic burden at peak hours at the present time." The question of increased traffic flow in the Forest Park area was raised, and the need for further study was stressed.
* Ann Q. Southworth, member of the Board of Selectmen in Longmeadow, in her letter of March 22, 1979, pointed to the "inadequacy of the flow of traffic at the juncture of Route 5

and Route 91 going north as well as the traffic problems at the entire South End Bridge area."

* The Lower Pioneer Valley Planning Commission has raised the bridge traffic issue several times,.

Additional data have been collected and analyzed in the Final EIR. The combination of this data and the traffic projections elsewhere in the report provide a fair measure of the likely effects of Route 57 traffic on the bridge.

Nevertheless, more detailed traffic study may be advisable in order to achieve a clearer understanding of possible traffic problems and the time and cost schedules for any suggested improvements. I note that the discussion on page 81 suggests that the capacity of Route 57, Route 5 and the South End Bridge can be determined by simple lane volumes and by "discounting geometric configuration" constrictions. Geometric problems, however, will generate congestion. The report indicates on pp. 81-82 that with "proper geometric improvements" the bridge has the capacity to accomodate a traffic growth of at least 50%. A discussion of potential improvements would have been useful, inasmuch as projected 1995 traffic increases on Route 57 are more than 80% higher than current traffic levels. It would appear that future congestion at the South End Bridge will have a limiting effect on the value of the widened Route 57, and major implications for proliferating land development proposals in Agawam.

INTERRELATED DEVELOPMENT

Overall planning for Route 57 improvements, adjacent land development and evaluation of South End Bridge improvements can become an interrelated package of sequential projects. There may be situations where one project or solution will generate a relocation of traffic or other environmental problems to another location, and thus develop the need for further construction solutions.

The Forest Park Civic Association in Springfield has expressed its concern that the improvements to Route 57 may be part of an initial phase of highway expansion which will eventually include the South End Bridge and the Sumner Avenue Freeway proposal. This concern deserves thoughtful response; I hope the Department and the Route 57 advocates in Agawam will demonstrate that the Route 57 proposals will indeed stand on their own merits and will function well without the need for further extensive construction in neighboring communities.

It is evident from the numerous comments received from the area that Agawam residents are supportive of the project, chiefly because of the severe environmental and safety problems associated with heavy traffic on Mill Street. It follows that careful planning and precautions are necessary to ensure that any future traffic growth associated with new Route 57 and nearby land development avoids any repetition of the current local street/residential area problems of safety and living environment.

LOCAL GROWTH ISSUES IN AGAWAM

It has been argued that the EIR was deficient in not specifically addressing as secondary impacts the recent development proposals for adjacent land. In the EIR, the Department has allowed for the factor of substantial traffic growth both regionally and for general land development in Agawam by providing for a general projected traffic increase within the study area. The 1995 projections for the Existing Upgrade/No Build situation reflect 60% increases in every traffic movement between Route 202 and the South End Bridge. For the Route 57 relocation, the traffic increases projected range between 80% and 120%. In view of the recently proposed land development concepts for Agawam, it is likely that the relative traffic increases associated with the Route 57 relocation would be considerably higher than the No-Build and that increases in Agawam would be proportionally higher than those in Southwick. These proposals include:

a. a $50 million commercial development with multiple functions
b. 600 condominium housing units
c. a racetrack.

The Department cannot be expected to include detailed evaluation of the impacts of such development in an EIR. However, the Department is urged to evaluate closely in any consequent studies and designs the traffic impacts of such development and to assist the Town of Agawam in evaluating these impacts and their implications for Route 57 and the South End Bridge.

In regard to the Town of Southwick, the Final Report properly notes that "The Town of Southwick in anticipation of properly controlling the potential growth should be prepared to exercise various planning measures, such as zoning ordinances, public facility and utility expansion and acquisition of land for public purposes." Similar recommendations, dealing with the far greater growth impacts on Agawam, would have been valuable.

THE FUTURE OF RURAL VALUES IN AGAWAM

The history of Agawam as a rural community stressing extensive farming of the Connecticut Valley flatlands has been challenged by the steady trends in past decades towards loss of farmland and increase in residential and commercial development. The State Department of Food and Agriculture has been making strong efforts to recognize the value of preserving remaining farmlands in the Commonwealth. Within Agawam and the region there appears to be no consensus regarding the value of such farmland preservation. Four farms are directly impacted by the construction of Route 57, and the direct impacts are fairly well described in the Final Report. However, indirectly these farms may be hampered by reductions in overall size and efficiency of operation. Furthermore,

stimulated land development may make it more difficult to continue maintenance of farming operations.

The larger question is whether Agawam officials wish to retain any of the farmland and rural qualities of the Town as growth proceeds in the future, and indeed may become urbanized. Agawam Public Works Superintendant John Stone has stated clearly (p. 93) the case for an urbanized Agawam:

> "Finally, I have always considered Agawam part of the Greater Springfield Urban Area. Roads and highways in Agawam have been included in the Federal Aid Urban Systems. For purposes of HUD's Small Cities Grant Programs we are considered part of a Mass Metro Area. Agawam is also part of the Springfield S.M.S.A. In addition, the Town participates in many metropolitan type projects and programs with the City of Springfield including wastewater treatment, water supply and solid waste disposal. With regard to the State Growth Policy, I believe Agawam is part of an urban area and is certainly not a rural community."

Ultimately, the resolution of this issue should occur at a local and regional level.

FURTHER STUDIES AND COMMENTS

It is likely that the Department will be receiving much public and official comment from many viewpoints regarding the impacts of Route 57 relocation. Further public hearings may be necessary to develop understanding and resolution to the differences which have yet to be resolved. The Department is encouraged to go beyond the Environmental Impact Report in seeking to resolve the environmental concerns of traffic and growth which have been raised during the environmental review process.

March 26, 1979
DATE

John A. Bewick
JOHN A. BEWICK, SECRETARY

JAB:SM:cg

The Commonwealth of Massachusetts

Executive Office of Transportation and Construction

Department of Public Works

.Ten .Park .Plaza. .Boston 02116-3973

August 7, 1987

James S. Hoyte, Secretary
Executive Office of Environmental Affairs
100 Cambridge Street 20th Floor
Boston, Massachusetts 02202

Dear Secretary Hoyte:

This is to notify you of a project change for Route 57 Agawam/Southwick highway project. Originally approval was received for the Final EIR for this project (EOEA File No. 00915) on February 15, 1979 for the proposed 4.5 miles of highway starting at Suffield Street Route 75 in Agawam and ending at Provin Mountain at a point westerly of the Agawam/Southwick town line.

Because of the concerns of the U.S. Fish and Wildlife Department of Interior and the U.S. Environmental Protection Agency Region I that the proposed relocation would impact the Leonard Pond wetlands, the Department has decided to prepare a Supplemental EIR for the last 1.9 miles of proposed highway relocated further north of Leonard Pond wetlands.

The Department of Public Works intends to construct the first 2.6 miles of proposed highway and the other 1.9 miles after approval of the Supplemental FEIR. The section of Route 57 to be constructed starts at the interchange at Suffield Street Route 75 and ends at South Westfield Street Route 187 in Agawam. The Supplemental FEIR will be for the section of proposed highway relocated further north, starting at South Westfield Street (Route 187) and ending at Provin Mountain. The terminus of the highway will meet with the existing Route 57 at a point just westerly of the Agawam/Southwick town line.

Enclosed you will find the "Scope of Work" for the environmental document and a 200 scale contour plan showing the previously proposed Route 57 and the new northerly proposed route.

If you require any further information, please contact Thomas R. Hession at the Department of Public Works, Tel. 973-7498.

Sincerely,

Robert H. Johnson
Chief Engineer

TRH/fwm
enclosure

PHASE II

ICHAEL S. DUKAKIS
GOVERNOR

JAMES S. HOYTE
SECRETARY

The Commonwealth of Massachusetts

Executive Office of Environmental Affairs
100 Cambridge Street
Boston, Massachusetts 02202

February 12, 1988

CERTIFICATE OF THE SECRETARY OF ENVIRONMENTAL AFFAIRS
ON THE
NOTICE OF PROJECT CHANGE

PROJECT NAME	: Route 57
PROJECT LOCATION	: Agawam/Southwick
EOEA NUMBER	: 915
PROJECT PROPONENT	: DPW
DATE NOTICED IN MONITOR	: September 11, 1987

Pursuant to the Massachusetts Environmental Policy Act (G.L.,c.30,s.61-62H) and Sections 11.17(3) the MEPA regulations (301 CMR 11.00), I hereby determine that the above project requires further MEPA review.

The Route 57 Agawam/Southwick project has a long history. The original proposal reviewed by the MEPA unit in 1978-1979 was for a 4.5 mile segment of highway starting at Suffield Street (Route 75) in Agawam and ending at Provin Mountain, of the Agawam/Southwick town line. Subsequent concerns of the U.S. Environmental Protection Agency and the U.S. Fish and Wildlife Service prompted proposals to relocate the highway further north of the Leonard Pond wetlands. The Leonard Pond wetlands are located at the westerly portion of the proposed project. With this view of the project, the MA DPW has proposed to prepare a Supplemental Environmental Impact Report for this westerly portion of the project (1.9 miles) while proceeding with the first easterly 2.6 miles of the project.

At first, this approach appeared to be reasonable. However, after careful consideration, further review must include the easterly as well as the westerly portion of the project. The reasons for this determination is threefold. First, it appears to me that the traffic impacts of implementing the first 2.6 miles as an interim solution must be reviewed. Given the as yet unapproved westerly section of the project, I cannot at this time assume that the implementation of the westerly 1.9 miles is guaranteed. Second, the easterly section of the project now

includes the Gardner Street interchange, a situation not anticipated when Certificate on the Final EIR was issued in February, 1979. Finally, the DPW comitted to work with the Department of Environmental Quality Engineering during the design of the project to assure an acceptable design in accordance with the wetlands protection regulations in effect at that time. I understand that such coordination has not taken place.

Given the difference in degree of change and potential for impacts between the eastern and western portions of the project, separate review processes are appropriate. In the case of the eastern section, this shall take the form of a Supplemental Wetlands and Traffic analysis, while the western section must be the subject of a complete Supplemental EIR. These documents may be prepared and reviewed on separate schedules, as may be dictated by anticipated construction sequence.

The Supplemental Wetlands and Traffic Analysis should respond fully to the concerns expressed above and in the attached correspondence. The Traffic Analysis must update the original traffic projects, incorporate the Gardner Street interchange, and document clearly the effects on the traffic network of constructing the eastern section without the western section. Should substantial negative impacts be revealed, the Traffic Analysis must propose interim, and perhaps permanent, measures to minimize these effects. The Wetlands Analysis must respond to the concerns raised by the Western Region of the DEQE and provide a basis upon which they may act on wetlands matters. Even though this project apparently falls under the pre-1983 wetlands regulations, I expect that the DPW will make every attempt to limit impacts and to provide replication for unavoidable wetland takings. I also strongly recommend that the MA DPW meet with representatives of the DEQE to resolve these issues during the preparation of the Supplemental Wetlands and Traffic Analysis.

A complete Supplemental EIR will be required for the western section of the project, as proposed by the MA DPW. In general, the proposed "Scope of Work" submitted by the MA DPW is sufficient and can be used as the outline of necessary environmental review with some additions. It is reasonable that the "laundry list" of potential impacts identified in the MA DPW's scope be applied in full to the western section. This list includes the following: traffic impacts, air quality, noise, water quality, floodplain, wetland; historic and archaeological; land use/economic development; social; ecological; right of way; special/hazardous waste, farm land, energy, construction, and secondary impacts.

The Supplemental EIR should present an overall review of the project and a brief history of its development. Clear graphics

PHASE II

PHASE II

should be included with the documentation. The MEPA regulations at 301 CMR 11.07 can be used for guidance in terms of outline and content. Appendices should be used where appropriate to maintain the document's focus on substantive issues.

Both the Supplemental Wetlands and Traffic Analysis and the Supplemental EIR should be circulated according to the MEPA regulations at 301 CMR 11.24. In addition, copies should be sent to the Town Boards of Agawam and Southwick and to the authors of the attached comments.

February 12, 1988
DATE

JAMES S. HOYTE, SECRETARY

Comments received:

10/15/87	M/M White
6/24/87	R. Waltermire
12/11/87	DEQE/West
1/6/88	DEQE/Boston

JSH/JD/bk

THE COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE OFFICE OF ENVIRONMENTAL AFFAIRS

MICHAEL S DUKAKIS
GOVERNOR

JOHN DEVILLARS
SECRETARY

February 17, 1989

CERTIFICATE OF THE SECRETARY OF ENVIRONMENTAL AFFAIRS ON THE DRAFT SUPPLEMENTARY TRAFFIC AND WETLANDS ANALYSIS

PROJECT NAME	:Phase I of the Proposed Relocation of Route 57
PROJECT LOCATION	:Agawam
EOEA NUMBER	:915
PROJECT PROPONENT	:MA DPW
DATE NOTICED IN MONITOR	:January 11, 1989

The Secretary of Environmental Affairs herein issues a statement that the Draft Supplementary Traffic and Wetlands Report submitted on the above project adequately and properly complies with the Massachusetts Environmental Policy Act (G.L., c.30, s.61-62H) and with its implementing regulations (301 CMR 11.00)

General

The Draft Supplementary Report under review herein is generally responsive to my Certificate on the Notice of Project Change issued February 12, 1988. It presented a great amount of data and analysis. A number of issues will require additional study in a Final Supplementary Report. These issues relate to commitment to necessary complementary mitigation related to the new Route 57 and its ramp system and the resulting changes in traffic patterns in the parallel corridor and further wetlands related analysis. These issues are discussed in greater detail below.

The Final Supplementary Report should employ improved graphic and presentation standards. During my review of the Draft, much time was spent in trying to understand the physical parameters of the project through graphics that were less than helpful. The presentation need not be fancy or slick, just clear and readable, with sufficient detail and consistent labeling to understand the project and its impacts. Additionally, an unbound report with loose figures supplied in envelopes will not be

acceptable. These documents become part of MEPA's permanent library and accordingly must be bound.

When complete, the Final Supplementary Report must be circulated to those who received the Draft.

Traffic

My comments on the Traffic Study will focus on Section 3.4 of the Report - mitigation. Again, given the uncertainty of the implementation of Phase II of the project, it is very important for Phase I to be able to stand alone. Under the MEPA Waiver criteria (310 CMR 11.18(3)(a), Phase I should not require the implementation of future phases. The study clearly shows a number of problems in the corridor related to the implementation of Phase I, as well as other project related impacts. A variety of mitigation measures were discussed in the report, including widening intersecting corridors, retiming of signals, and placement of signal conduits for future signalization. What is not clear, however, from the report is whether or not these mitigation measures are included in the Phase I project or if they were merely "identified" for purposes of the report. I am most concerned about the following locations:

o The S. Westfield Street (Route 187) corridor from the terminus of the relocated Route 57 to the intersection of existing Route 57 (Southwick/Springfield Street) will require complementary mitigation as shown in the report, such as minor widenings for left turn lanes, work at the ramps of the highway itself, placement of signal conduits. The Final Report must discuss this related mitigation and its implementation.

o The intersection of S. Westfield Street (Route 187)/Southwick Street - Springfield Street (Existing Route 57) will be failing after 1990. By 2000, the intersection cannot be improved by simple retiming of equipment. The Final Report should explore long range improvements for this intersection to be considered as a part of the Phase I implementation of relocated Route 57.

o The Draft Report includes a simple measure to improve the Level of service at the Garden Street interchange through restriping. Is there enough pavement width there to accomplish this?

o Finally, with regard to the Frontage Road, the Final Report should should give more thought to a solution to the problem at the Frontage Road/Suffield Street (Route 75). How will this intersection function with respect to the ramp system? Should a comprehensive solution be considered for the Route 57 ramps/Suffield Street (Route 75)/Frontage Road/Mill Street area?

Wetlands

The supplemental wetland analysis contained much more information on the project than was understood at the time the Notice of Project change was filed. The DEQE has submitted good comments on the Report, and I understand the the MDPW and the DEQE have consulted frequently on the preparation of the required information. The MDPW should take guidance from the DEQE's comment and further consultation is strongly advised. A number of wetlands related issues, as outlined below, require more information to consider a action by the DEQE.

The proposed project places a lot of fill in the floodplain. The Final Supplemental Report must deal with the location of compensatory flood storage areas, which are as yet undetermined.

The Draft Report dealt only with the footprint of wetlands impacted by the project. The Final Report must analyze the extent to which the wetlands will be indirectly impacted, including changes to the surface and subsurface hydrology.

The Massachusetts Natural Heritage Program submitted comments concerning rare species which occur in the area. The MDPW must confer with the Natural Heritage Program staff to determine ways to feasibly mitigate impacts to these species. The results of these meetings must be reported on in the Final Report. Additionally, the MDPW should consult with DEQE regarding the acceptability of the Adamus methodology on a Massachusetts Notice of Intent.

With respect to wetland replication, I am most pleased with the MDPW's willingness to consider this mitigation. I am concerned, however, about the actual implementation of this mitigation and its feasibility. The Final Report must provide more information on the mitigation plans. Additionally, I would recommend that the replication mitigation for the project be done as a part of the project construction so as to assure its implementation.

February 17, 1989
DATE

Steven C. Davis, for
John DeVillars, Secretary

Comments received:
PVPC - Feb. 10, 1989
MA Natural Heritage - Feb. 10, 1989
M/M white - Feb. 13, 1989
DEQE - Feb. 17, 1989
JPD/JMD/jmd

THE COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE OFFICE OF ENVIRONMENTAL AFFAIRS

MICHAEL S. DUKAKIS
GOVERNOR

JOHN DeVILLARS
SECRETARY

August 2, 1989

CERTIFICATE OF THE SECRETARY OF ENVIRONMENTAL AFFAIRS ON THE FINAL SUPPLEMENTARY TRAFFIC AND WETLANDS ANALYSIS

PROJECT NAME	:Phase I of the Proposed Relocation of Route 57
PROJECT LOCATION	:Agawam
EOEA NUMBER	:915
PROJECT PROPONENT	:MA DPW
DATE NOTICED IN MONITOR	:June 26, 1989

The Secretary of Environmental Affairs herein issues a statement that the Final Supplementary Traffic and Wetlands Report submitted on the above project adequately and properly complies with the Massachusetts Environmental Policy Act (G.L., c.30, s.61-62H) and with its implementing regulations (301 CMR 11.00).

The Final Report is more clear and readable than the Draft Report submitted on the above referenced project. Through these Reports, a clear understanding of the anticipated impacts can be gathered. While I find the Report is adaquate, it is with the knowledge that the impacts of the project, particularly with respect to wetlands alteration, are great. The MDPW is committed to complying with the most current wetland regulations (to the extent possible). The Department of Environmental Protection must carefully consider the appropriateness of any approvals it gives to advance this project within its regulatory responsibilities.

Traffic

In my review of the Draft, I was particularly concerned that the MDPW commits to and be responsible for additional improvements on streets and at intersections that will be impacted by the implementation of the project, as well as the ability of Phase I to stand alone.

Based on my review of the Final Supplementary Report, I find the MDPW has upgraded the proposed mitigation for the project. Table 1 (pg. 3-4) summarizes the improvement the MDPW will undertake in the Route 187 Corridor. I note that while the Level of Service at Route 187/Existing Route 57 will be LOS D with this mitigation, and LOS D is generally acceptable in peak hours in urban areas, the MDPW should strive to improve the LOS through further design modifications, if possible.

Additionally, the Final Report states that "These measures will be in place when Phase One is open to traffic." I am pleased that the MDPW has made this commitment.

The Final Report also outlines additional construction that will be undertaken at Garden Street at the ramp vicinity for widening, as well as restriping in the outer areas of the project.

The Final Report also presents information on the performance of the intersection of the Frontage Road and the intersection of Frontage Road/Suffield Street and Suffield Street and Mill Street. It appears that even though the Town is planning a safety improvement project that would include signals at the Suffield Road/Mill Street intersection, it would be entirely appropriate for the MDPW to assist in this project as mitigation for Route 57 impacts.

In summary, the Traffic section of the Final Supplemental Report adequately responds to my comments on the Draft and commits to the necessary mitigation to support the project.

Wetlands

The analysis in the Final Report has responded to the questions raised on the Draft. Additional information may be required by the DEP and/or the local Conservation Commission in the permitting process.

I am pleased that the MDPW has met with the Natural Heritage program and has committed to mitigation to protect, to the extent possible if this project goes forward, the rare species in the area, and has committed not to introduce nursery strains of swamp birch as part of the wetlands replication.

August 2, 1989
DATE

JOHN DeVILLARS, SECRETARY

Comments received:
Muriel and Craig White

JPD/JMD/jd
B:ROUT57.JMD

The Commonwealth of Massachusetts
Executive Office of Transportation and Construction
Department of Public Works
Ten Park Plaza, Boston, MA 02116-3973

WILLIAM F WELD
GOVERNOR

ARGEO PAUL CELLUCCI
LIEUTENANT GOVERNOR

RICHARD L TAYLOR
SECRETARY

JAMES J. KERASIOTES
COMMISSIONER

February 6, 1992

Janet McCabe, Assistant Secretary
Executive Office of Environmental Affairs
100 Cambridge Street, 20th Floor
Boston, MA 02202
ATTN: Ms. Jollene Dubner, MEPA Unit;
EOEA Number 915

Dear Janet McCabe:

On Monday, February 3, 1992, we met with Ms. Jollene Dubner of your staff to discuss proposed modifications to Phase One of the approved Route 57 project in Agawam. These modifications have been suggested by local officials to improve traffic operations and access. We have performed supplemental traffic counts, assignments, and analyses of the various options to determine if the modifications are appropriate. It appears that certain modifications can be implemented which will improve traffic operations , address local concerns and allow the removal of the westbound frontage road between Suffield Street and Mill Street.

As discussed at that meeting, we intend to submit the traffic study with a recommendation for modifications to this approved project as a Supplement to the Final Supplemental Traffic and Wetlands Analysis prepared by the Department for Phase One of the Proposed Relocation of Route 57. This Supplement will address the traffic implications of the alternatives evaluated, including updated traffic counts (1991) and projections (2001) for the AM and PM peak hours. The report will also include a section discussing the environmental implications of the proposed modifications.

We hope to file the Supplement with your office and circulate it to others this month. As discussed with Jollene , the report will be reviewed by the MEPA Unit as a Supplemental EIR, and will be subjected to a thirty day public comment period. If you have any questions or comments regarding this project, please do not

hesitate to contact me at 973-7484, or Tom Hession of my staff at 973-7498.

Sincerely,

Frank A. Bracaglia, PE
Deputy Chief Engineer
Project Development

TRH/trh

The Commonwealth of Massachusetts
Executive Office of Environmental Affairs
100 Cambridge Street, Boston, 02202

WILLIAM F. WELD
GOVERNOR

ARGEO PAUL CELLUCCI
LIEUTENANT GOVERNOR

SUSAN F. TIERNEY
SECRETARY

(617) 727-9800

February 11, 1992

Mr. Frank Bracaglia
Deputy Chief Engineer
Project Development
Massachusetts Department of Public Works
10 Park Plaza
Boston, MA 02116

Re: Route 57 Agawam, EOEA #915 Project Change

Dear Mr. Bracaglia:

I am in receipt of your letter of February 6, 1992 regarding proposed modifications to Phase One of the approved Route 57 Project. The Secretary of Environmental Affairs concurs with your plan to file the traffic study completed by the Department on the various options studied to improve projected traffic operations. This traffic study would be filed as a supplement to the Final Supplemental Traffic and Wetlands Analysis. In addition, your letter notes that the report will include a section discussing the environmental implications of the proposed modifications.

When complete, this Supplement should be circulated to those who received the last official environmental document submitted to MEPA by the MDPW. It will be noticed in the Monitor for a thirty day public comment period.

I look forward to reviewing this Supplement to the Final Supplemental Traffic and Wetlands Analysis. Should you have nay questions, please contact me or Jollene Dubner of the MEPA staff at 727-5830.

Sincerely,

Janet G. McCabe

Janet G. McCabe
Assistant Secretary

JGM/JMD/jmd
P:RTE57

100% RECYCLED PAPER

The Commonwealth of Massachusetts
Executive Office of Environmental Affairs
100 Cambridge Street, Boston, 02202

WILLIAM F. WELD
GOVERNOR

ARGEO PAUL CELLUCCI
LIEUTENANT GOVERNOR

SUSAN F. TIERNEY
SECRETARY

(617) 727-9800

May 14, 1992

Mr. Frank Bracaglia, P.E.
Deputy Chief Engineer
Project Development
Massachusetts Highway Department
10 Park Plaza
Boston, MA 02116

Re: Supplement to the Final Traffic and Wetlands Analysis, Relocation of Route 57, Agawam, EOEA #915

Dear Mr. Bracaglia:

The Supplement the Final Traffic and Wetlands Analysis has been reviewed by the MEPA Staff and has been noticed in the Environmental Monitor of April 7, 1992 for a 30 day review period. The Supplement describes six alternatives considered for modifications to Phase One of the approved Route 57 project.

The Department has chosen Alternative 4 as the preferred alternative. In the main, these modifications appear to be appropriate. They improve traffic operations, address local concerns and allow the removal of the westbound frontage road between Suffield Street and Mill Street. This alternative reduces direct project related impacts on an existing condominium development on Suffield Street and to residential abuttors along Mill Street, Suffield Street and Cooper Street. In addition, there are no wetland or floodplain impacts associated with the construction of the preferred alternative.

The Supplemental Analysis adequately describes the impacts associated with the project modification and it is the opinion of the Secretary of Environmental Affairs that no further MEPA review is required at this time.

I would like take this opportunity to bring the Department's attention to the comment letter received from Massachusetts Audubon concerning wetlands that have become established in the stormwater management basins of the ongoing project. The Massachusetts Audubon suggests that the Department might want to consider maintaining artificially created wetlands established during project construction as replication of direct wetland impacts are not usually 100% successful and this would provide

100% RECYCLED PAPER

additional wetland areas for the project. This suggestion merits serious consideration by the Department as the implementation of the project moves forward.

Thank you for keeping the MEPA Unit informed of changes in the project as development proceeds.

Sincerely,

Janet McCabe
Assistant Secretary
Environmental Impact Review

JGM/JMD/jmd

P:RTE57PC

I. PURPOSE AND NEED

A. BACKGROUND

The Massachusetts Highway Department (MHD) initiated improvements to the Route 57 corridor in 1959 when Route 57 was extended as a 6 lane limited access highway from US Route 5 to Main Street (Route 159). Later projects in 1960 and 1962, extended the road as a four lane limited access highway to Mill Street in Agawam.

In 1971, a corridor study evaluated Relocation of Route 57 as a limited access highway through Agawam to Hillside Road in Southwick. Community opposition led MHD to drop consideration of relocating the segment of Route 57 in Southwick. Based upon the above, the MHD initiated a new environmental and engineering study in 1974 which considered a No Build Alternative, a Limited Build Alternative, and a Partial Relocation Alternative. The Partial Relocation Alternative involved constructing a limited access roadway in Agawam and spot safety improvements in Southwick. An Environmental Assessment (EA) was prepared for this Alternative under requirements of the National Environmental Policy Act and a Negative Declaration was issued in 1979. Draft and Final EIRs were also prepared for this Alternative under the Massachusetts Environmental Policy Act and a Certificate on the final EIR was issued in 1979.

In 1983 in response to the recommendations of a metropolitan area task force, a half diamond interchange was added at Garden Street to serve the Westmass Industrial Park. The proposed project had proceeded to final design when the U.S. EPA proposed to invoke Section 404(c) of the Clean Water Act to protect the wetland system tributary to Leonard Pond.

To allow sufficient time to evaluate and mitigate impacts to the Leonard Pond wetland system, MHD proceed with the Project in two phases and notified the Executive Office of Environmental Affairs (EOEA) of a Project Change in 1987. In response, the EOEA Secretary issued a Certificate establishing the required Scope of further environmental review for Phase I and Phase II. Draft and Final Supplemental EIRs have been completed for Phase I, the eastern portion of the proposed project, and construction is now under way. Construction of the roadway subgrade and bridges is substantially complete and the overall Phase I project is expected to be substantially complete by the fall of 1993. Phase II, the western portion of the proposed project, is the subject of this Supplemental Environmental Impact Report (SEIR).

Because Phase II will require a permit under Section 404 of the Federal Clean Water Act, preparation of this SEIR is being coordinated with the three step U.S. Army Corps of Engineers (USACE) Highway Methodology. By letter dated October 3, 1990, the USACE determined the basic Project Purpose, thereby completing Step I.[1] Phase I - Avoidance (Step 2) of the USACE Highway Methodology, which seeks to avoid wetland loss through analysis of alternatives, is also complete. By letter dated May 15, 1992, the USACE determined that Alternatives III/III(a) and IV/IV(a) should be carried forward.[2] Phase II (Step 3) of the USACE Highway Methodology is ongoing and involves further evaluation of Alternatives III/III(a) and IV/IV(a). Following a joint public hearing by the MHD and the USACE, Phase II will be completed and the Corps will select the Least Environmentally Damaging Practicable Alternative (LEDPA). Minimization follows selection of the LEDPA and involves modifications to reduce wetland loss. Compensation for unavoidable wetland loss will be required and will involve refinement of the conceptual replacement wetland areas indicated in this Draft SEIR.

[1] William F. Lawless, P.E., October 3, 1990, op.cit.
[2] William F. Lawless, P.E., May 15, 1992, op.cit.

B. PROJECT NEED

Existing Route 57, Southwick Street, has serious traffic safety and operational problems caused by numerous substandard roadway elements. Substandard elements include an excessive number of closely spaced curb cuts, narrow travel lanes, poor sight distance, lack of proper signalization, inadequate pedestrian protection, undefined shoulders and sidewalks, lack of a westbound truck climbing lane approaching Provin Mountain, variable speed zones, and conflicts between local and through traffic. The problems caused by these deficiencies are amplified by the heavy traffic volumes which are forced to use existing Southwick Street because of the lack of an alternative east/west arterial.

The effect of these substandard roadway elements on vehicular safety is evidenced by 1988 data for accidents involving property damage and personnel injury. The previously upgraded limited access portion of Route 57 east of Mill Street experienced only 15 accidents. The unimproved section of existing Route 57 experienced 138 accidents. Of these 138 accidents, 23 occurred on the segment of Southwick Street (Route 57) between South Westfield Street and the Southwick town line. These 23 accidents included 13 involving property damage only and 10 involving personal injury. The 23 accidents constitute 369 accidents per One Hundred Million Vehicle Miles (100 MVM) which is 138 percent of the statewide average of 267 accidents per 100 MVM for primary two lane urban roadways. The 10 personal injury accidents constitute 160 accidents per 100 MVM which is 160 percent of the statewide average of 100 personal injury accidents per 100 MVM for primary two lane urban roadways.

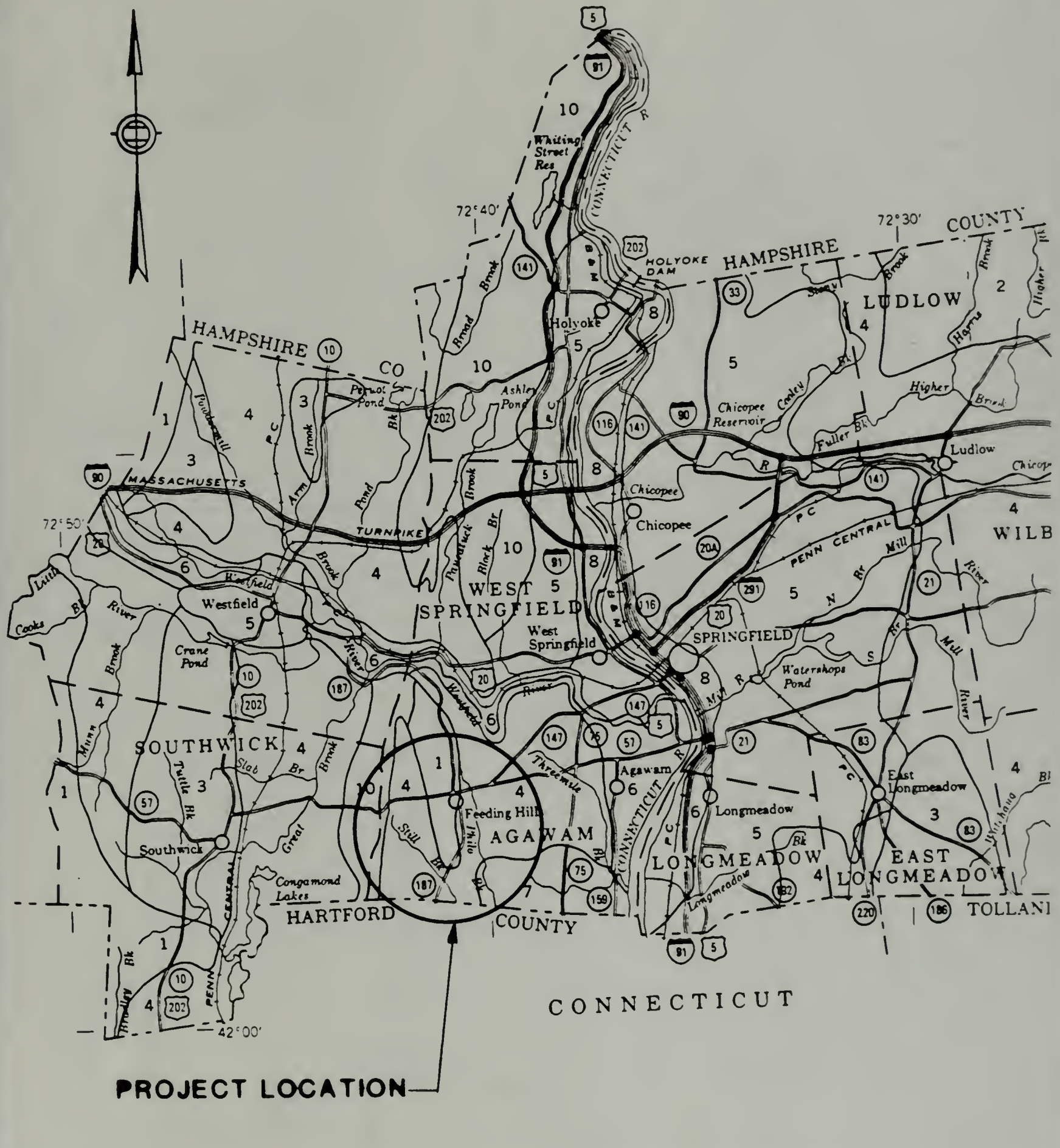
In addition to the above safety problems, capacity limitations will cause congestion and delays along Southwick Street (Route 57) west of South Westfield Street (See Table 1). These safety and capacity deficiencies will worsen over time as traffic volumes increase.

Currently, Southwick Street west of South Westfield Street carries approximately 13,700 vehicles per day. Ongoing trends in suburbanization along the Route 57 corridor and increased vehicle use will cause this to increase to 20,810 vehicles per day by 2013, a 52 percent increase.

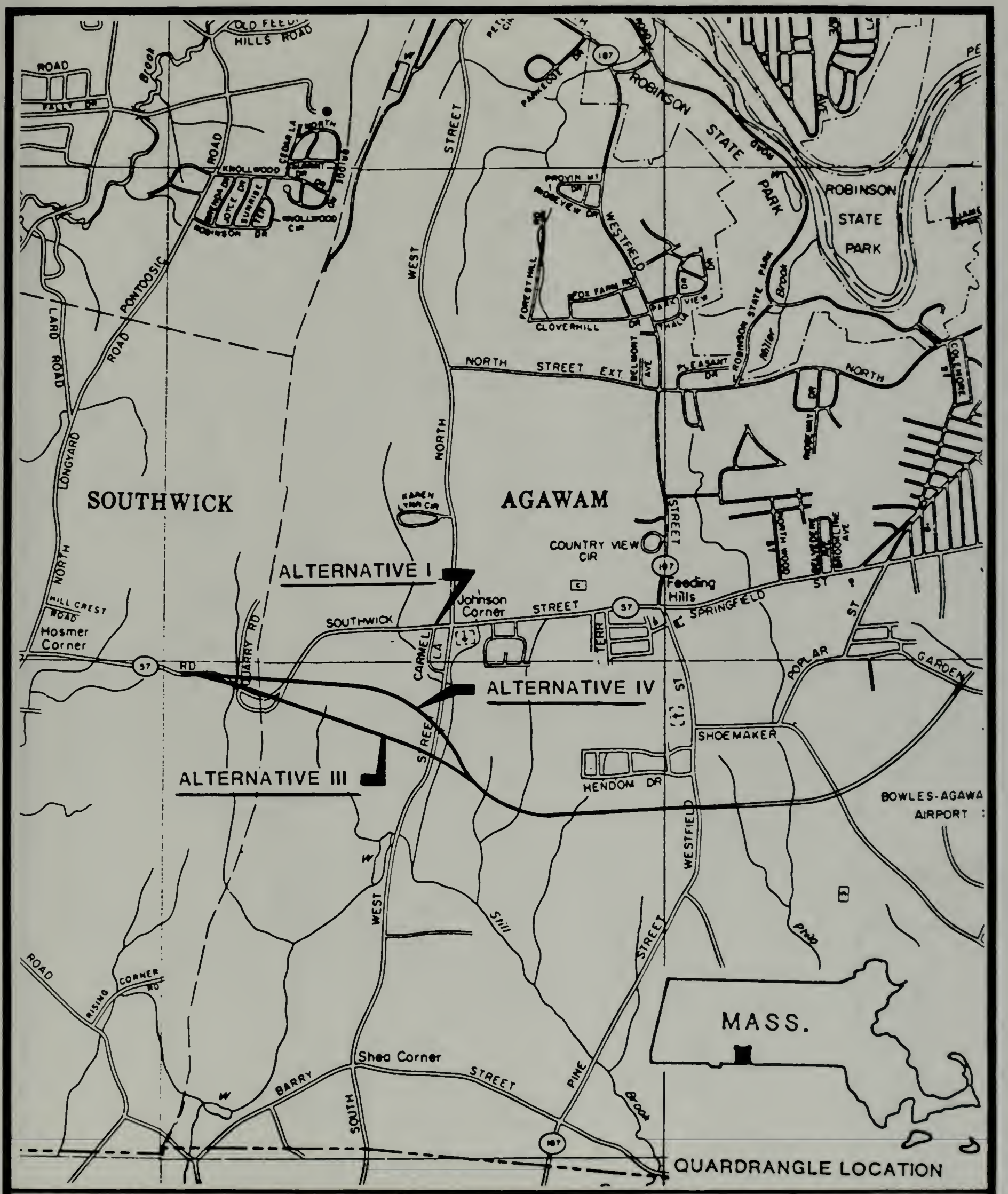
The intersection of Southwick and South Westfield Streets presently operates at Level of Service F. The No Build Alternative consists of a continuation of existing conditions and involves no construction, however, improvements to South Westfield Street and to the intersection of Southwick and South Westfield Streets will be provided as part of a separate project. Under the 1993 No Build condition, Level of Service will improve from F to D with the intersection improvements. By the year 2013, growth in traffic volumes will cause the operation of the intersection to again deteriorate to Level of Service F even with the improvements.

TABLE I-1
INTERSECTION LEVEL OF SERVICE
SOUTHWICK (ROUTE 57) AND SOUTH WESTFIELD (ROUTE 187) STREETS

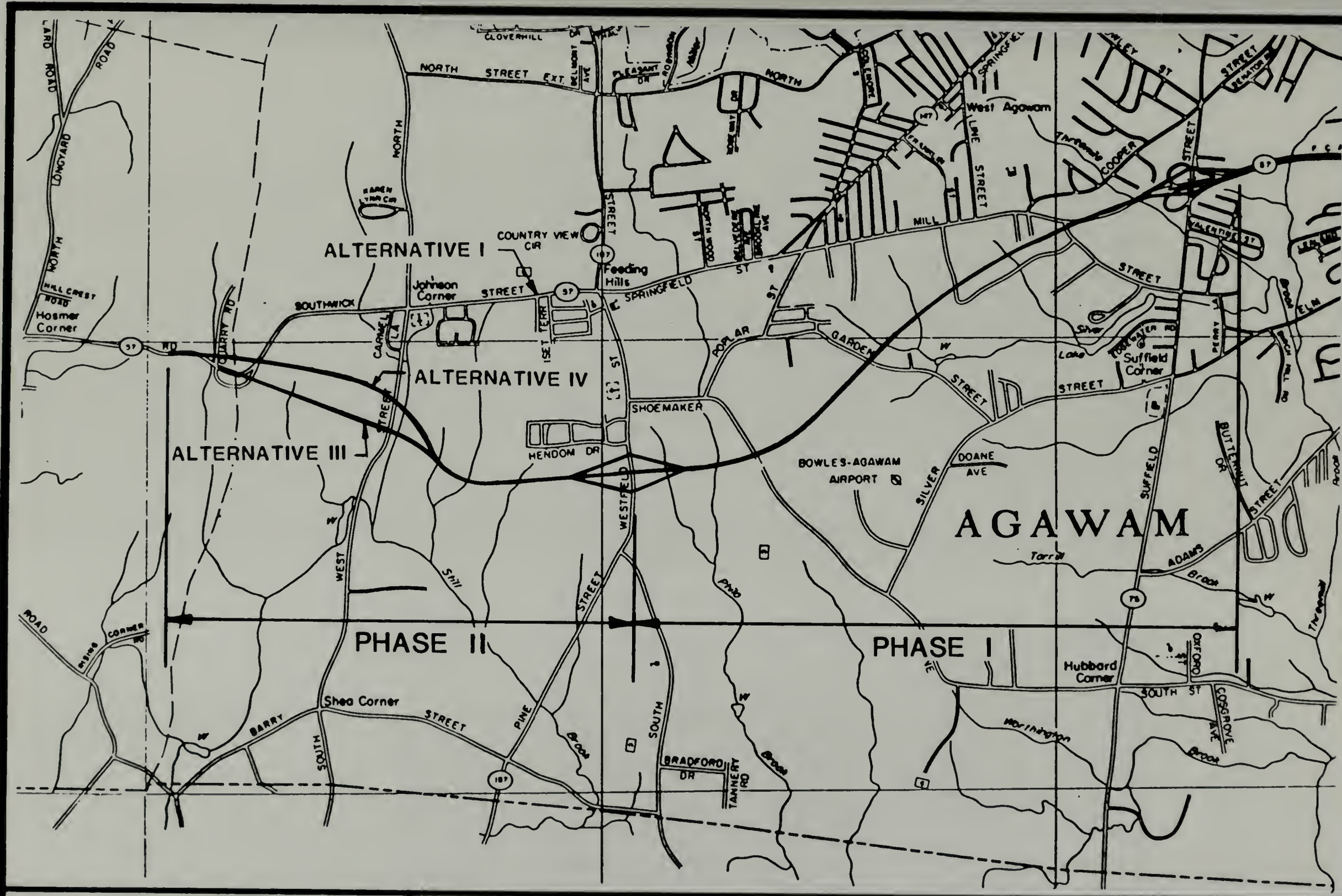
	Existing		Year 1993		Year 2013	
	AM	PM	AM	PM	AM	PM
Existing Conditions	C	F	N/A	N/A	N/A	N/A
No Build With Intersection Improvements	N/A	N/A	D	D	F	F
Alternatives III & IV With Intersection Improvements	N/A	N/A	B	B	B	B



ROUTE 57 RELOCATION AGAWAM AND SOUTHWICK MASSACHUSETTS	REGIONAL MAP	I-1 FIGURE



ROUTE 57 RELOCATION AGAWAM AND SOUTHWICK MASSACHUSETTS	LOCUS MAP	I-2 FIGURE



ROUTE 57 RELOCATION
AGAWAM AND SOUTHWICK
MASSACHUSETTS

ROUTE 57 RELOCATION
PHASE I & PHASE II

I-3
FIGURE

C. PURPOSE

Based upon the above, the Massachusetts Highway Department in consultation with the Corps of Engineers and the Federal Resource Agencies have defined the Project Purpose as follows:

> the "*...purpose of the project is to resolve long standing safety and capacity deficiencies, in traffic operations and access, on existing Route 57 in Agawam, Massachusetts and to provide increased traffic capacity while moving traffic along an east-west corridor.*"[1]

Relocating Route 57 will cause through traffic to be diverted to the new roadway, which will minimize conflicts between local and through traffic. The decrease in traffic will alleviate the long standing safety and capacity deficiencies on existing Route 57. The existing roadway will be able to accommodate these reduced traffic volumes at good Levels-of- Service. The decrease in traffic will also alleviate accident potential for those accidents associated with vehicular conflicts.

When either of the Build Alternatives for the Route 57 Relocation is completed, the future 24 hour traffic volume on Southwick Street, between South Westfield Street (Route 187) and South West Street, will decrease from the existing 13,700 vehicles per day to 5,310 vehicles per day in 1993 (a 61 percent decrease) and to 7,060 vehicles per day in 2013 (a 49 percent decrease).

Under existing conditions, the intersection of Southwick and South Westfield Streets operates at Level-of-Service F during the Weekday PM Peak Hour. Improvements to the intersection under a separate project will temporarily address these operational deficiencies. Level of Service D will be provided during the 1993 AM and PM Peak Hours. Under the No Build Alternative, these operational problems will again deteriorate. The intersection will again operate at Level of Service F during the AM and PM peak hours by the year 2013. Following the relocation of Route 57, the intersection will operate at Level-of-Service B during the Weekday PM Peak Hour in 1993 and 2013.

The existing capacity deficiencies causes motorists to use local streets to bypass Southwick Street. Under the No Build Condition, increases in background traffic will cause more and more motorists to seek alternative routes through local streets. The proposed project will reduce congestion on Southwick Street, thereby alleviating the adverse effects of bypass traffic on safety and residential quality.

[1] William F. Lawless, P.E., October 3, 1990.

THIS PAGE INTENTIONALLY LEFT BLANK

II. ALTERNATIVES

A. CURRENT ALTERNATIVES

1. Overview of Current Alternatives

The following Alternatives and Subalternatives are currently under consideration by the Massachusetts Highway Department (MHD):

Alternative I	- No Build Condition
Alternative III	- At-Grade Signalized Intersection at South West St.
Alternative III(a)	- Grade Separation at South West Street
Alternative IV	- At-Grade Signalized Intersection at South West St.
Alternative IV(a)	- Grade Separation at South West Street

2. Alternative I

The No Build Condition, establishes the future environmental baselines which serve as the basis for the identification and evaluation of impacts. Alternative I represents the conditions which will exist if the proposed project is not implemented and is based upon existing conditions and established trends. The baseline conditions established for Alternative I are based on the premise that the Phase I portion of the Route 57 Relocation Project will be constructed and operational.

3. Build Alternatives

Alternatives III and IV both begin at South Westfield Street (Route 187) where a new diamond interchange will be constructed with Relocated Route 57 passing under South Westfield Street. Both build alternatives will be constructed as four lane limited access divided highways roughly paralleling Southwick Street between South Westfield and South West Streets. As indicated in Fig. II-3, this roadway segment consists of two 12 foot travel lanes, a 4 foot inner shoulder, and a 10 foot outer shoulder in each direction, separated by a 42 ft. grassed median. The build alternatives pass under South Westfield Street and continue west crossing South West Street . In the vicinity of South West Street, the new roadway will transition from a four lane divided highway to a two lane undivided road. This section of roadway consists of two 12 ft. travel lanes, a 12 ft. climbing lane for westbound trucks, a 4 foot shoulder westbound, and a 10 foot shoulder eastbound.

Alternatives III and IV provide an at-grade signalized intersection at South West Street. Alternatives III(a) and IV(a) provide a grade separation at South West Street, however, highway access ramps will not be provided. Precluding access at South West Street helps to preserve the roadway's rural character, however, traffic will increase slightly on other local streets, including Southwick Street and South Westfield. An at-grade signalized intersection versus a grade separation structure carrying South West Street over Relocated Route 57 is the only difference between Alternatives III and III(a) and between Alternatives IV and IV(a).

In view of potential 404(c) action, MHD has agreed to limit impacts on the wetland system tributary to Leonard Pond by using bridges or culverts to span Wetlands No. 4, 5, 6, and 7. Due to the requirement to span Wetlands No. 4, 5, and 6, the anticipated construction cost of Alternative III is approximately $21 million versus $14 million dollars for Alternative IV.

The safety and traffic congestion problems on existing Route 57 are caused by substandard roadway elements including: numerous curb cuts, narrow travel lanes, poor sight distance, inadequate signalization, undefined shoulders, lack of a truck climbing lane approaching Provin Mountain, variable speed zones, and conflicts between local and through traffic.

All Build Alternatives effectively address these operational and safety deficiencies. Relocated Route 57 itself is provided with adequate control of access, lane width, sight distance, signalization, and shoulders. Both Alternatives have a westbound truck climbing lane approaching Provin Mountain. In addition, by diverting through trips to the new roadway, intermixing of through and local traffic is minimized. By reducing current traffic volumes, capacity deficiencies and safety are enhanced on Southwick Street Route 57 and on the local streets now being used to bypass.

4. Alternative III and III(a)

Alternative III and III(a) were developed in response to concerns about the probable adverse effects caused by Alternative II on the Leonard Pond wetland system. The alignment of Alternative III and III(a) lies to the north of Alternative II, farther from Leonard Pond and its bordering wetlands. Alternative III necessitates the relocation of 5 residences and 3 farms, whereas Alternative III(a) necessitates the relocation of 17 residences and 3 farms. To facilitate connection to Southwick Street, the terminus of existing Route 57 is relocated approximately 300 feet to the east where it intersects at a new at-grade "T" intersection.

These Alternatives require placing fill within Wetland Areas 1, 2, 3, 9, 10, 11, 12, 13, and 15. A total of 9.2 and 9.0 acres of wetland are filled under Alternative III and Alternative III(a), respectively. None of these wetlands are part of the Leonard Pond system. These wetlands exhibit a moderate to high probability rating in performing the functions of groundwater discharge, flood flow alteration, and sediment stabilization. With the exception of Wetland No. 1, 3, and 12, they are considered to have a high to moderate effectiveness and opportunity for sediment/toxicant retention and nutrient removal/transformation. Total wetland fill under Alternatives III and III(a) is approximately 1 acre less than the total to be filled under Alternative IV and IV(a). Alternatives III and III(a) include bridging Wetland Areas 4, 5, 6 and 7.

5. Alternative IV and IV(a)

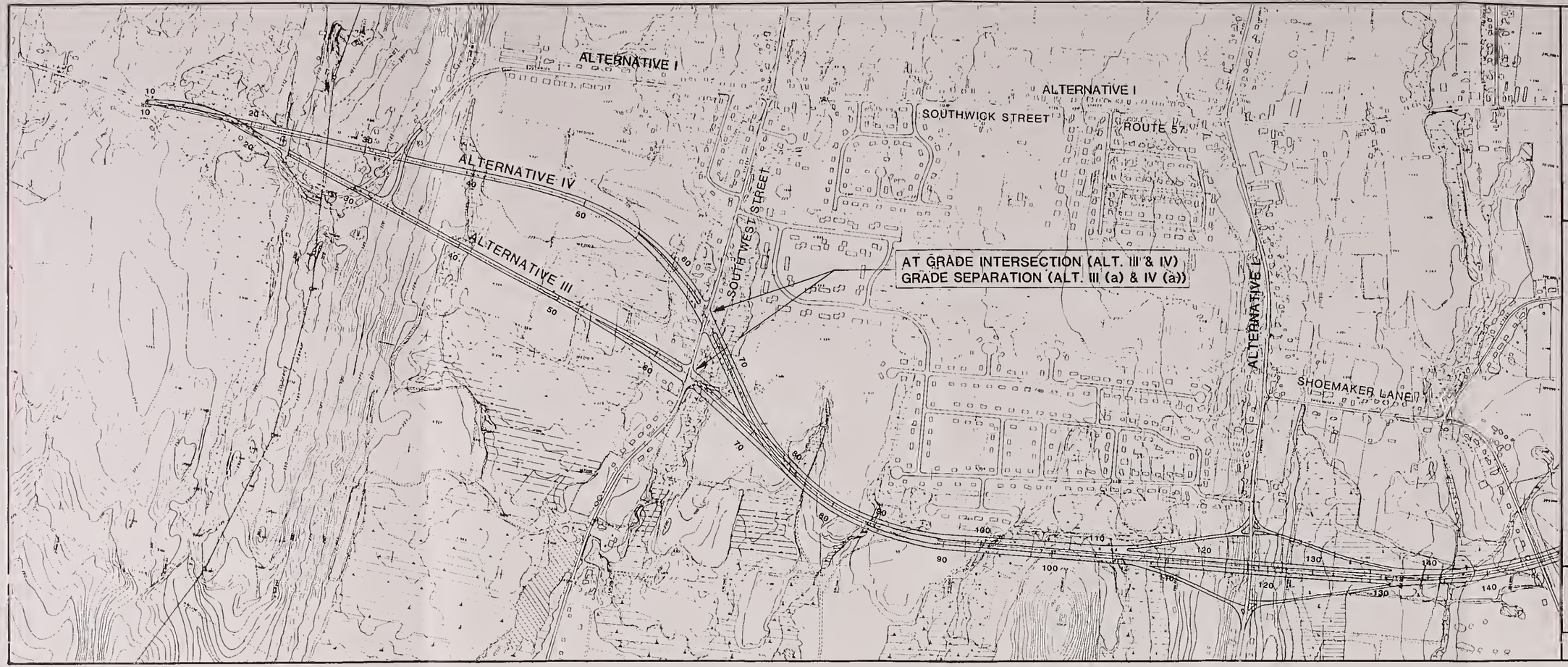
The alignment of Alternative IV and IV(a) lies to the north of Alternative III and III(a). It further minimizes impacts on wetland resources, however, it causes greater relocation impacts. Alternative IV will require the relocation of 10 residences and 3 farms, whereas Alternative IV(a) will require the relocation of 18 residences and 3 farms.

Alternative IV and IV(a) intersects existing South West Street at a greater skew angle than Alternative III and III(a). To minimize any associated operational and safety problems with the proposed at-grade signalized intersection under Alternative IV, and to reduce the length of the proposed grade separation structure under Alternative IV(a), the roadway approaches of South West Street may have to be realigned and reconstructed to reduce the intersecting skew angle. Alternative IV and IV(a) will meet existing Route 57 at a new four way at-grade intersection near the Agawam/Southwick Town Line.

Alternative IV and IV(a) require placing fill within Wetland No. 1, 2, 3, 9, 10, 11, 12, 13, 14, and 15. The total wetland area to be filled is 10.3 acres under Alternative IV and 9.9 acres under Alternative IV(a). No fill would be placed within the wetlands contiguous to Leonard Pond. The affected wetlands exhibit a moderate to high probability rating in performing the functions of groundwater discharge, flood flow alteration, and sediment stabilization. With the exception of Wetland No. 1, 3, and 12, these wetlands are considered to have a high to moderate effectiveness and opportunity for sediment/toxicant retention and nutrient removal/ transformation. Alternatives IV and IV(a) include the bridging of Wetland No. 7 only.

Figures II-1, II-2, and II-3 indicate alignments, profiles and typical roadway sections for the current alternatives. As a result of the ongoing activities under Step 3 of the Highway Methodology with the Corps of Engineers and federal resource agencies, the typical roadway sections shown on Figure II-3 are subject to refinement.

THIS PAGE INTENTIONALLY LEFT BLANK

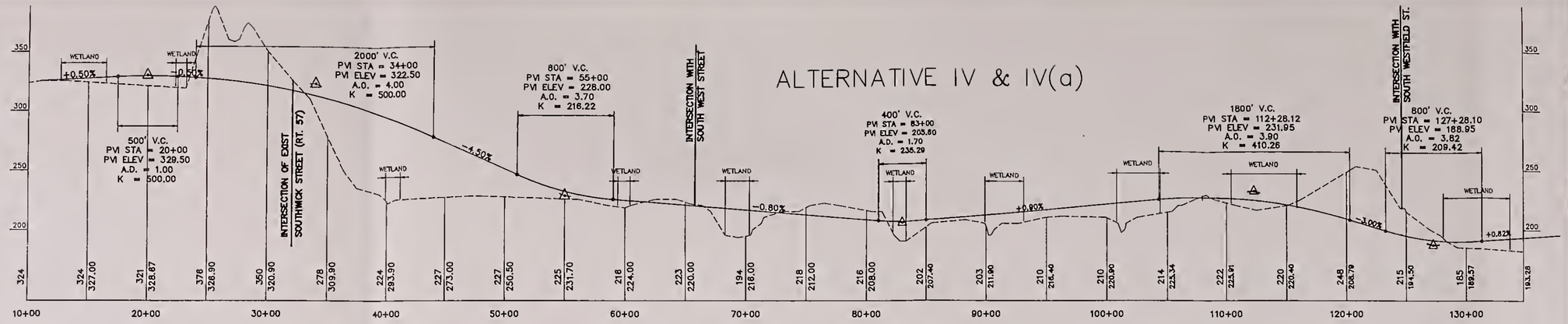


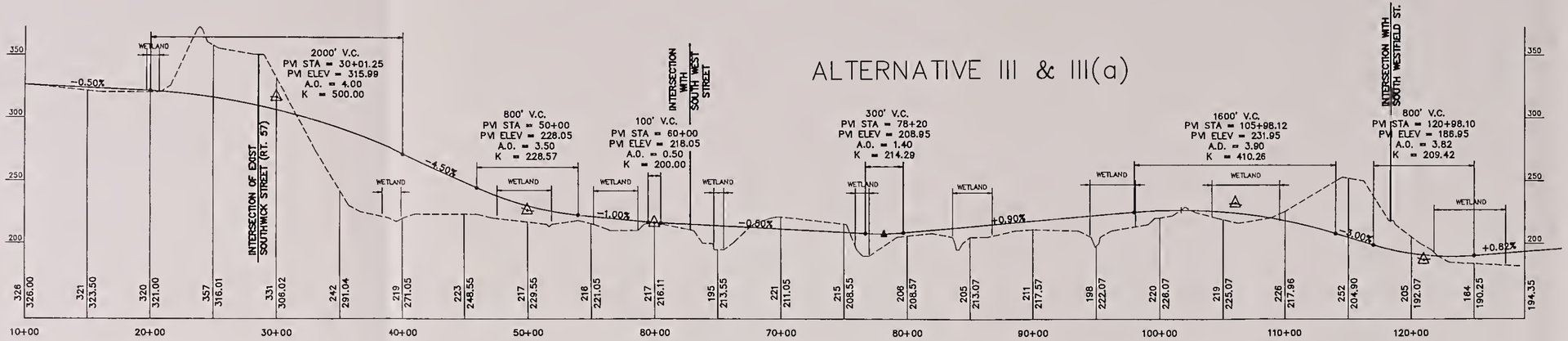
COMMONWEALTH OF MASSACHUSETTS
DEPARTMENT OF PUBLIC WORKS

ROUTE 57 RELOCATION

ALTERNATIVE ALIGNMENTS

FIG. NO. II-1





COMMONWEALTH OF MASSACHUSETTS
DEPARTMENT OF PUBLIC WORKS

ROUTE 57 RELOCATION

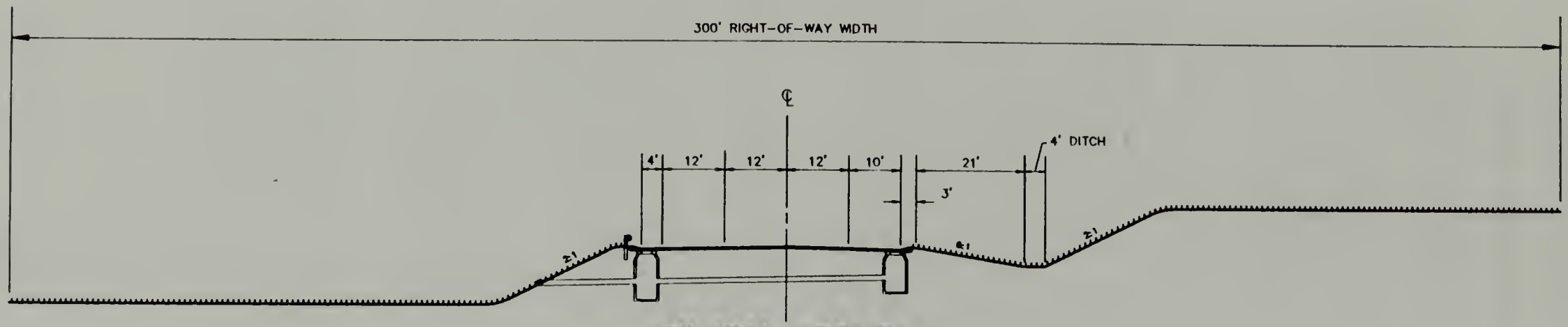
PROFILES

SCALE IN FEET

HORIZ. 0 600 1200

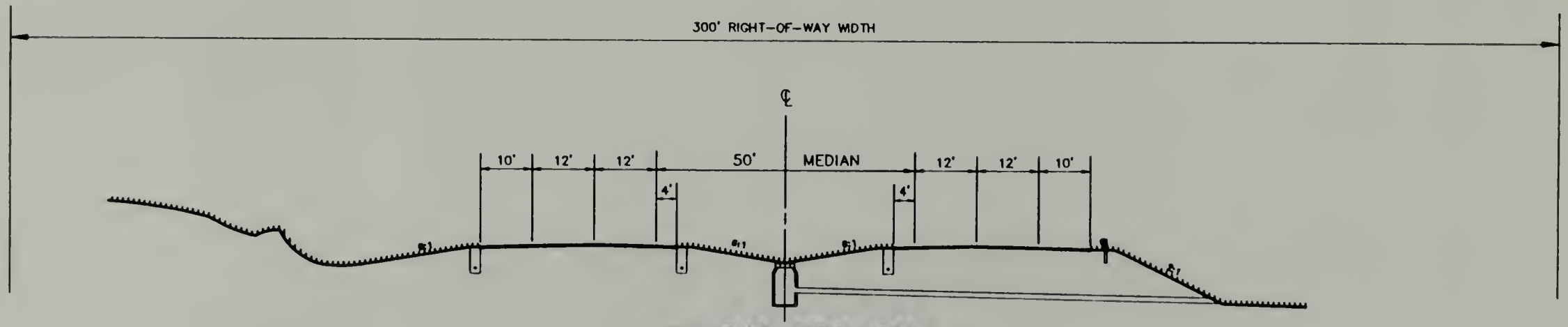
VERT. 0 60 120

FIG. NO. II-2



TYPICAL SECTION

SOUTHWICK TOWN LINE TO SOUTH WEST STREET



TYPICAL SECTION

SOUTH WEST TO SOUTH WESTFIELD STREET

ROUTE 57 RELOCATION AGAWAM AND SOUTHWICK MASSACHUSETTS	TYPICAL ROADWAY SECTIONS	II-3 FIGURE

B. DISMISSED ALTERNATIVES

1. Overview of Dismissed Alternatives

The following alternatives were developed after 1988, and are no longer being considered for implementation:

Upgrade Existing Route 57 Alternative
Alternative II
Alternative V
Alternative V(a)

2. Upgrade Existing Route 57

This Alternative would involve substantial construction both on new alignment and within existing roadway rights-of-way. South Westfield Street would be widened to five (5) lanes between Relocated Route 57 (Phase I) and Shoemaker Lane and to four (4) lanes north of Shoemaker Lane. The intersection of South Westfield Street with Relocated Route 57 would be constructed as a four-way at-grade intersection with traffic signal control. Dual turning lanes would be provided on South Westfield Street southbound and on Relocated Route 57 westbound. Access to Hendom Heights would be upgraded by constructing Elmer Drive Extension. The westbound highway off ramp provided under Phase I would be reconstructed to provide two lanes in each direction, separated by a median. The westbound approach to the intersection of South Westfield Street and Shoemaker Lane would be widened and signal control provided, if warranted.

Southwick Street (Existing Route 57) would be widened to four lanes and left turns would be restricted between South Westfield Street and South West Street

An 80 foot wide roadway section would be provided along Southwick Street, consisting of four 12 foot travel lanes, two 8 foot parking lanes and two 8 foot sidewalks. West of South West Street, a 60 foot wide roadway section would be provided consisting of two 12 foot travel lanes, one 12 foot westbound truck climbing lane, one 8 foot shoulder, one 4 foot shoulder, and two 6 foot sidewalks.

The intersection of Southwick and North/South Westfield Streets would be further reconstructed to provide three approach lanes on the northbound and eastbound approaches and two approach lanes on the other two approaches. The traffic signal system would be fully updated.

This Alternative would not be comparable to the other build alternatives which relocate Route 57 onto a new right-of-way in terms of safety, vehicular operations, and control of access. Due to the many existing properties along South Westfield and Southwick Streets, limitations on access would not be practicable. Traffic flow would be disrupted by turns at driveways. Local and through traffic would continue to be mixed on a single roadway.

Because work is required within existing traveled ways, there would be substantial disruption of vehicles and pedestrians traffic during construction. Already serious capacity deficiencies would deteriorate further during the construction period and motorists would experience increased delays. Detours and disruption of traffic during construction would cause secondary noise and traffic impacts on local roadway by-passes.

Widening South Westfield and Southwick Streets would transform these roadways into highway scale facilities. All of their remaining rural character would be destroyed. This would segment the community and affect the residential quality of contiguous neighborhoods.

This Alternative would require filling a total of 1.37 acres of wetland. Reconstruction of the ramps approaching South Westfield Street would involve filling of approximately 1.09 acres of Wetland Area No. 15. Wetland Area No. 15 contains both palustrine forested and palustrine emergent wetlands and is categorized as having moderate effectiveness for performing the function of groundwater discharge. It is categorized as having moderate to high effectiveness for performing the functions of flood flow alteration and sediment stabilization. The wetland has a moderate effectiveness and a high opportunity for sediment and toxicant retention and nutrient removal and transformation. Due to the lack of open water and low edge irregularity, Area No.15 is considered to have a low to moderate effectiveness for wildlife breeding and low effectiveness for wildlife migration.

Widening of existing Route 57 to provide a westbound truck climbing lane would necessitate filling approximately 0.09 acres of Wetland No. 9, 0.08 acres of Wetland No. 12, and 0.11 acres of Wetland No. 13. Wetland No. 9 includes both palustrine forested broadleafed deciduous wetlands and palustrine emergent wetlands. Wetland No.12 and 13 are palustrine forested broadleafed deciduous wetlands. These wetlands are categorized as having moderate to high effectiveness for performing the function of groundwater discharge. They are categorized as having moderate to high effectiveness for performing the function of flood flow alteration and sediment stabilization. The wetlands have a moderate to high effectiveness and a moderate to high opportunity for sediment and toxicant retention. They have a moderate to high effectiveness for nutrient removal and transformation and for wildlife wintering. Wetland No. 15 has a low effectiveness for wildlife migration, while the other impacted wetlands have a high effectiveness for wildlife migration. Wetland No. 9 has a high effectiveness for wildlife breeding and aquatic diversity and abundance. Wetland No. 12 and 13 have a low effectiveness for wildlife breeding and a moderate to low effectiveness for aquatic diversity and abundance.

The Upgrade Existing Route 57 Alternative would necessitate the relocation of nine (9) businesses and eleven (11) dwelling units. Although acquisition of principal structures is not necessary, a 7 foot wide strip of land would be acquired from all properties fronting on the upgraded segment of Southwick Street east of South West Street. A 7 to 11 feet wide strip would also be acquired from all properties fronting on the upgraded segment of South Westfield Street. Because the existing roadways only occupy a portion of the right-of-way, the physical impacts of widening would be greater than the 7 to 11 feet of additional right-of-way takings. It is also anticipated that left turn restrictions would adversely affect commercial properties. There is an old cemetery which encroaches into the right-of-way on the south side of Southwick Street, just east of South West Street. The roadway reconstruction would involve excavation within a 20 to 25 foot wide strip along the front of this cemetery. The number of graves which may have to be relocated has not been determined at this time, however, disturbance of this cemetery is expected to be of special concern to the Town.

Although there are no properties on the National Register of Historic Places that would be directly impacted by this Alternative, the three residences will would be demolished at the intersection of Southwick and South West Streets are of concern to the Agawam Historical Commission. Their demolition would result in an irreversible loss of important cultural resources.

The Upgrade Existing Route 57 Alternative would cause greater noise impacts, both during construction and in the long term, than any of the build alternatives which relocate Route 57 onto a new alignment. Due to the proximity of existing structures to the roadway, fugitive dust generated by construction would adversely affect homes and businesses.

3. Alternative II

This Alternative is a section of the Partial Relocation Alternative, which was originally developed in 1974 and which was the subject of the 1979 EA/Negative Declaration. Similar to Alternatives III and IV, it involves the reconstruction of Route 57 on a new alignment between South Westfield Street and the Agawam/Southwick Town line.

This Alternative crosses Wetland No. 1, 2, 3, 8, 9, 10, 11, 12, 13, and 15. A total of 15.3 acres of wetland would be filled of which 4.1 acres are within Leonard Pond system. These wetlands are effective in performing the functions of groundwater discharge, flood flow alteration, sediment stabilization, nutrient removal and transformation, and production export. Many of these wetlands have a high to moderate effectiveness for supporting a diversity of wetland dependent birds during breeding and migration.

In particular, Alternative II would affect Wetland Area No. 8 which is contiguous to Leonard Pond, effectively bisecting what is now a contiguous wetland and open space area. Under Alternatives III, IV, and V, bridges would be constructed to carry Route 57 over any wetlands within the Leonard Pond watershed. Due to its length, the cost of a comparable bridge under Alternative II would be prohibitive. Accordingly, Alternative II would have a disproportionate effect on the Leonard Pond wetlands. Alternative II would cause greater adverse effects on wildlife than the other build alternatives because it bisects the large contiguous habitat area bordering Leonard Pond.

4. Alternative V

This Alternative also involves the relocation of Route 57 between South Westfield Street and the Agawam/Southwick Town Line. As indicated in Figure II-5, the ramps from the limited access Phase I segment of Relocated Route 57 would be modified and connect to South Westfield Street at a four-way at-grade intersection. This intersection would operate under signal control and would provide dual turning lanes southbound on South Westfield Street and westbound on Relocated Route 57. Access to Hendom Heights would be upgraded by constructing Elmer Drive Extension. An approximately 3200 foot segment of South Westfield Street between Relocated Route 57 and Shoemaker Lane would be reconstructed as a four lane divided roadway. The intersection of South Westfield Street and Shoemaker Lane would be reconstructed as a four way at-grade signalized intersection with two westbound approach lanes on Shoemaker Lane and three eastbound approach lanes on Relocated Route 57. Three southbound and four northbound approach lanes would be provided on South Westfield Street. Relocated Route 57 would extend west from the Shoemaker Lane as a four lane limited access highway to a four-way at-grade intersection at South West Street. Traffic signal control would be provided, if warranted. West of the South West Street, the road would transition to a two way highway, with a climbing lane for westbound trucks. A bridge would be provided over Wetland No. 7.

This Alternative would not be comparable in terms of vehicular operations, safety. and convenience to Alternatives III and III(a) and Alternatives IV and IV(a) which relocate Route 57 onto a new right-of-way with full control of access. Safety and operational problems would arise from using a short segment of South Westfield Street to link two segments of higher speed, limited access highway, Due to the remaining properties along South Westfield Street, no limitation on access is practicable. Drivers using this segment of South Westfield Street would not sufficiently reduce speed or anticipate vehicle conflicts. The intermixing of local and through traffic would continue to lead to safety problems.

This Alternative would require filling a total of 5.97 acres of wetland. Reconstruction of the ramps approaching South Westfield Street would involve filling of approximately 1.09 acres of Wetland Area No. 15. The segment of the Alternative between South Westfield Street and South West Street would require filling of approximately 0.93 acres of Wetland No. 3, 0.44 acres of Wetland No. 16, and 1.50 acres of Wetland No. 17. Alternative V would also require filling approximately 1.09 acres of Wetland No. 18 which lies just to the west of South West Street. The location of Existing Wetlands No. 16, 17, and 18 is indicated in Figure IV-2. These wetland areas contain palustrine forested wetlands and/or both palustrine forested wetlands and palustrine emergent wetlands.

Widening to provide a westbound truck climbing lane would necessitate filling approximately 0.24 acres of Wetland No. 9, 0.13 acres of Wetland No. 12, 0.48 acres of Wetland No. 13, and 0.07 acres of Wetland No. 14. Wetland No. 9 includes both palustrine forested broadleafed deciduous wetlands and palustrine emergent wetlands. Wetland Areas 12, 13, and 14 are palustrine forested broadleafed deciduous wetlands.

Wetlands No. 9, 12, and 13 are categorized as having moderate to high effectiveness and Wetlands No. 3 and 14 is characterized as having a low effectiveness for performing the function of groundwater discharge. They are categorized as having moderate to high effectiveness for performing the function of flood flow alteration and sediment stabilization. Wetland No. 3 has a low effectiveness and a high opportunity for sediment and toxicant retention. The other wetlands have a moderate to high effectiveness and a moderate to high opportunity for sediment and toxicant retention. Wetlands No. 3 and 14 has a low effectiveness for nutrient removal and transformation. The other wetland areas have a moderate to high effectiveness for nutrient removal and transformation. These wetlands have a moderate to high effectiveness for wildlife wintering. Wetlands No. 14 and 15 have a low to moderate effectiveness for wildlife migration, while the other impacted wetlands have a high effectiveness for wildlife migration. Wetland Area 9 has a high effectiveness for wildlife breeding and aquatic diversity and abundance. Wetland No. 3, 12, and 13 have a low effectiveness for wildlife breeding and a moderate to low effectiveness for aquatic diversity and abundance. Wetland No. 14 and 15 have a low to moderate effectiveness for wildlife breeding.

Construction of Alternative V would cause greater relocation impacts than any of the other build alternatives. It requires the relocation of three (3) businesses, eighty-six (86) dwelling units, and a church. Of the eighty-six (86) total dwelling units, seventy-seven (77) are within Pheasant Hill Village, which is "Section 8" subsidized housing for the elderly and low and moderate income families. This excessive relocation would disrupt the community cohesiveness. Relocation of the elderly presents particular hardships. Finding comparable housing for the elderly and low and moderate income families is difficult. Alternative V also encroaches on a portion of an existing cemetery on South Westfield Street. Whether any graves would have to be relocated has not been determined at this time, however, any impacts on this cemetery are expected to be of special concern to local residents.

Due to the proximity of residences, Alternative V would cause greater noise impacts both during construction and in the long term than Alternatives III, III(a), IV or IV(a).

5. Alternative V(a)

This Alternative also involves the relocation of Route 57 between South Westfield Street and the Agawam/Southwick Town Line. The ramp connections and the improvements to South Westfield Street would be comparable to those provided under Alternative V, except no median would be provided on South Westfield Street. Alternative V(a) would extend west from Shoemaker Lane to South West Street as a two lane two way roadway with no control of access. A four-way at-grade intersection would be constructed on South West Street and traffic signal control would be provided, if warranted. A bridge would be provided carrying Route 57 over Wetland No. 7.

This Alternative would be substantially inferior to Alternatives III, III(a), IV and IV(a) in terms of vehicular operations, travel time, safety, and convenience.

Alternative V(a) uses an existing road through "Pheasant Hill Village" as part of its alignment. This development is a Massachusetts Housing Finance Agency (MHFA) subsidized multi-family housing development containing 200 units of housing for the elderly, handicapped, and low and moderate income families. Pheasant Hill Village contains about 50 percent of the subsidized affordable housing units in the Town of Agawam. Pheasant Hill Village is a quiet cohesive residential community that Agawam regards as a notable step in attaining its policy of providing an adequate supply of affordable housing. Conversion of a quiet residential street to a primary regional arterial highway would cause significant adverse impacts on vehicular safety, particularly with respect to the elderly, handicapped, and children who are residents of Pheasant Hill Village. Residential quality would be degraded. Pheasant Hill Village and South West Street residents would be adversely affected by disruption, noise, safety, and dust during construction. These adverse effects would be of particular concern as they affect elderly residents of Pheasant Hill Village.

Unlike all other alternatives, Alternative V(a) would be restricted to one travel lane in each direction. This restriction would result in significant capacity deficiencies and delays. When the facility is completed, it would already be at capacity during both the morning and evening peak hours. Increases in traffic volumes between 1993 and 2013 would cause the capacity of the roadway to be exceeded, resulting in Level of Service F, i.e. failure. Level of Service F is characterized by excessive traffic congestion, unacceptable delays, and lines of queued vehicles. Good design practice should, at a minimum, provide Level of Service C in the design year. Constructing a new roadway which would operate at capacity when it opens and deteriorates to failure prior to the design year in not acceptable or reasonable.

Lines of idling vehicles emit a higher level of Carbon Monoxide than vehicles which experience better operating conditions. Therefore, in addition to substandard vehicular operations, Alternative V(a) would contribute to air pollution, particularly to short term Carbon Monoxide (CO) concentrations.

Unlike Alternatives III, IV, and V, there would be no controls on access along the right of way for Alternative V(a) Therefore development would be stimulated along its entire frontage. Abutting landowners could subdivide their property into building lots without incurring the cost of constructing subdivision roadways. Therefore the land along the corridor is expected to be rapidly developed. This rapid development would adversely affect the Town and increase demand on schools and other municipal services.

This induced development would also increase sedimentation and erosion during construction. There would be a permanent increase in the volume of stormwater runoff and this stormwater would contain contaminants typical of residential sites. These changes in hydrology and contaminant loadings could adversely affect water and wetland resources. Many of these residences may have on lot septic systems which contribute effluent to groundwater.

Alternative V(a) would require filling a total of 3.04 acres of wetland. Reconstruction of the ramps at South Westfield Street would involve filling of approximately 1.09 acres of Wetland Area No. 15. Between South Westfield Street and South West Street, approximately 0.20 acres of Wetland No. 3; 0.18 acres of Wetland No. 16; and 0.65 acres of Wetland No. 17 would be filled. These wetland areas contain palustrine forested wetlands and/or both palustrine forested wetlands and palustrine emergent wetlands. Widening to provide a westbound truck climbing lane would necessitate filling approximately 0.24 acres of Wetland No. 9; 0.13 acres of Wetland No. 12; 0.48 acres of Wetland No. 13; and 0.07 acres of Wetland No. 14. Wetland No. 9 includes both palustrine forested broadleafed deciduous wetlands and palustrine emergent wetlands. Wetland No. 12, 13, and 14 are palustrine forested broadleafed deciduous wetlands.

Wetlands No. 9, 12, and 13 are categorized as having moderate to high effectiveness and Wetlands No. 3 and 14 are characterized as having a low effectiveness for performing the function of groundwater discharge. They are categorized as having moderate to high effectiveness for performing the functions of flood flow alteration and sediment stabilization. Area No. 3 has a low effectiveness and a high opportunity for sediment and toxicant retention, while the others have a moderate to high effectiveness and a moderate to high opportunity for sediment and toxicant retention. Areas No. 3 and 14 have a low effectiveness while the others have a moderate to high effectiveness for nutrient removal and transformation. These wetlands have a moderate to high effectiveness for wildlife wintering. Wetlands No. 14 and 15 have a low to moderate effectiveness, while the others have a high effectiveness for wildlife migration. Wetland No. 9 has a high effectiveness for wildlife breeding and aquatic diversity and abundance. Areas No. 3, 12, and 13 have a low effectiveness for wildlife breeding and a moderate to low effectiveness for aquatic diversity and abundance. Areas No. 14 and 15 have a low to moderate effectiveness for wildlife breeding.

Construction of the Alternative V(a) would necessitate the relocation of one (1) business, fourteen (14) dwelling units, and a church. The roadway's slopes would encroach on a triangular shaped portion of an existing cemetery on South Westfield Street. Whether any graves would have to be relocated has not been determined at this time, however, any impacts on this cemetery are expected to be of special concern to local residents.

Due to the proximity of residences, Alternative V(a) would cause greater construction and long term noise impacts than Alternatives III, III(a), IV or IV(a).

C. PRELIMINARY FULL RELOCATION ALTERNATIVES

1. Background

Initially, the Massachusetts Highway Department (MHD) considered relocating Route 57 as a limited access divided highway extending from Suffield Street in Agawam to Hillside Road in Southwick. Community opposition led MHD to drop consideration of relocating the portion of Route 57 in Southwick.

2. Summary

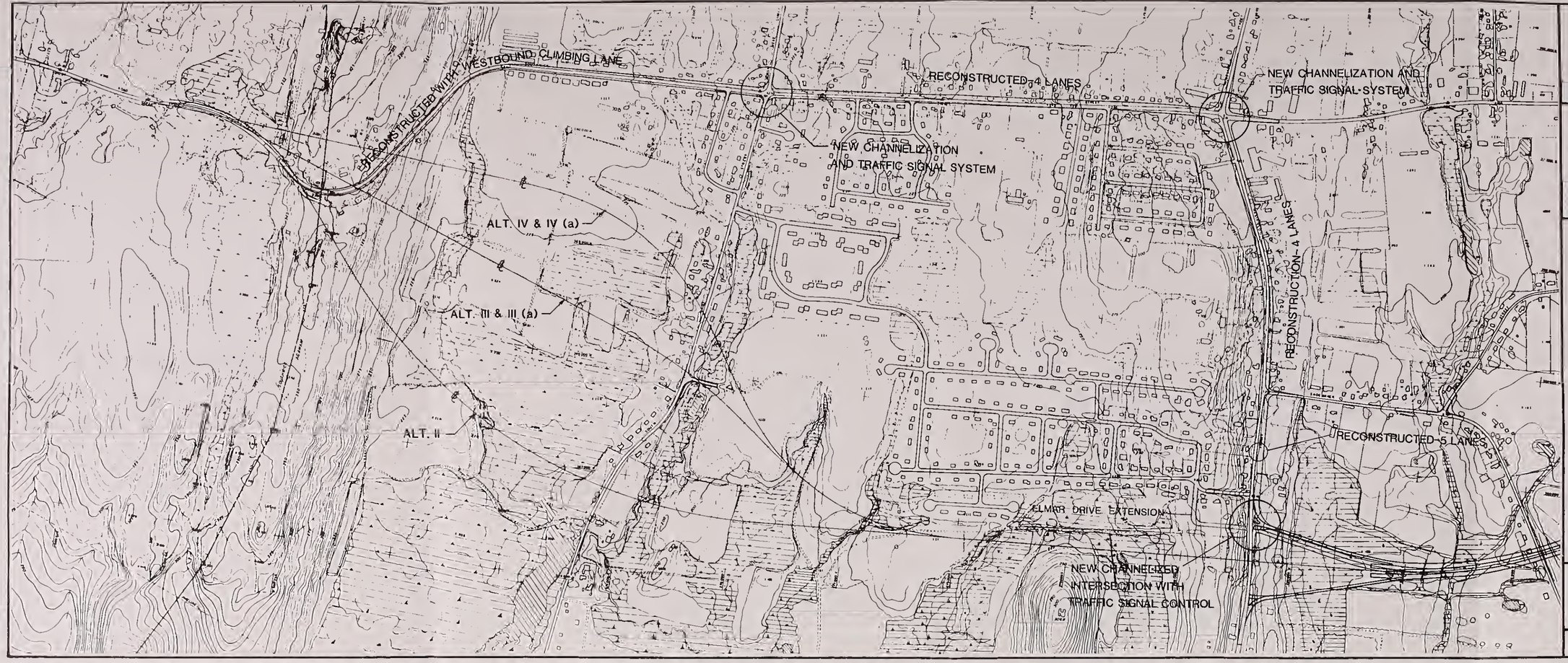
These Preliminary Full Relocation Alternatives are summarized in Table II-1 and are depicted in Figure II-6.

TABLE II-1

RELOCATION OF ROUTE 57
SUMMARY OF FULL RELOCATION ALTERNATIVES

Plan	Status	Description
Line B	Rejected	Required extensive relocation in the vicinity of Shoemaker Lane
Line C	Refined	Selected, for further analysis. Portion in Southwick deleted prior to 1976. Phase II segment evolved into Alternative II.
Line D	Rejected	Passed through Leonard Pond itself and divided residential neighborhoods in Southwick.
Line E	Rejected	Divided residential neighborhoods in Southwick.
Line F	Rejected	Passed through an industrial site in Southwick.
Line G	Rejected	Bisects Hendom Heights neighborhood, passed through Agawam Junior High School.
Line W	Rejected	Impacted streams, ponds, and Silver Lake watershed.

THIS PAGE INTENTIONALLY LEFT BLANK


RECONSTRUCTED WITH 2 WESTBOUND CLIMBING LANE
RECONSTRUCTED 4 LANES
NEW CHANNELIZATION AND TRAFFIC SIGNAL SYSTEM
NEW CHANNELIZATION AND TRAFFIC SIGNAL SYSTEM
ALT. IV & IV (a)
ALT. III & III (a)
ALT. II
RECONSTRUCTION - 4 LANES
RECONSTRUCTED 5 LANES
ELMAR DRIVE EXTENSION
NEW CHANNELIZED INTERSECTION WITH TRAFFIC SIGNAL CONTROL

COMMONWEALTH OF MASSACHUSETTS
DEPARTMENT OF PUBLIC WORKS

ROUTE 57 RELOCATION

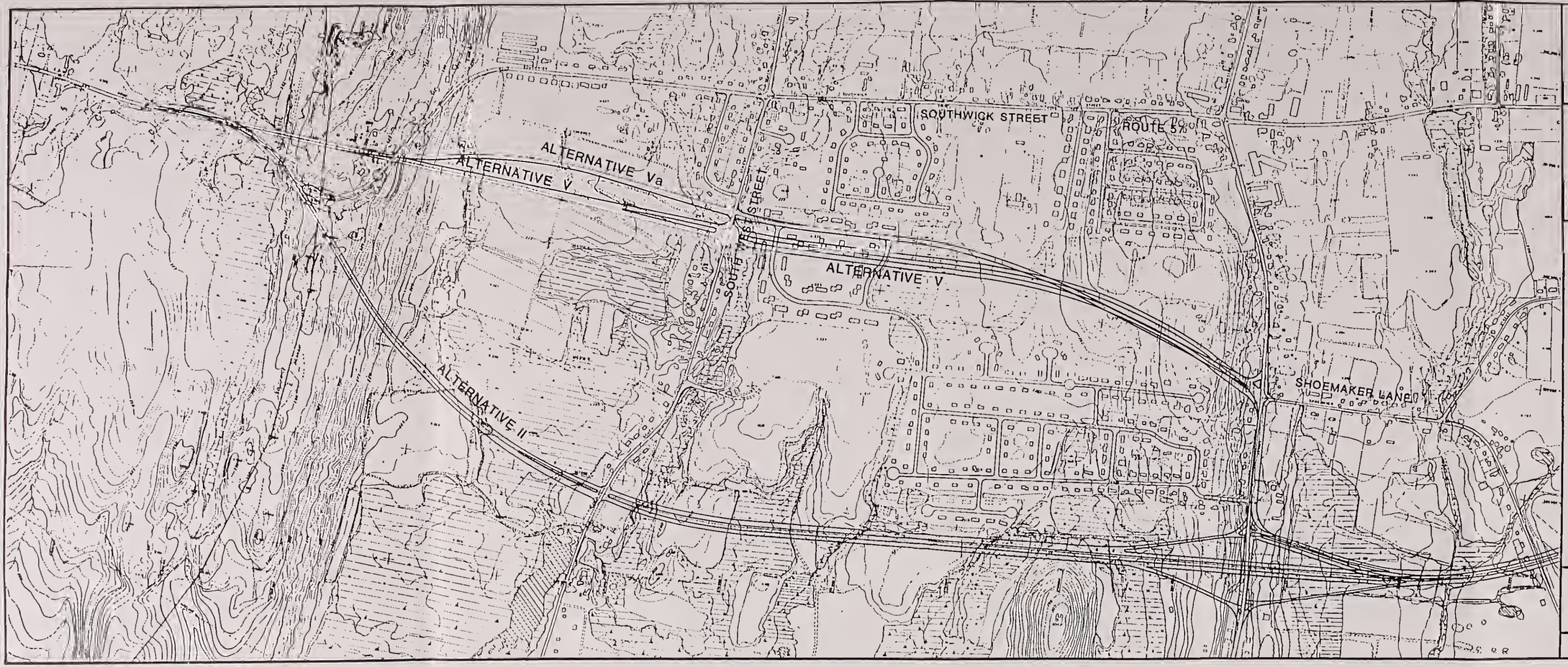
UPGRADE EXISTING ROUTE 57 ALTERNATIVE

N

0 600 1200

HOR. SCALE IN FEET

FIG. NO. 11-4

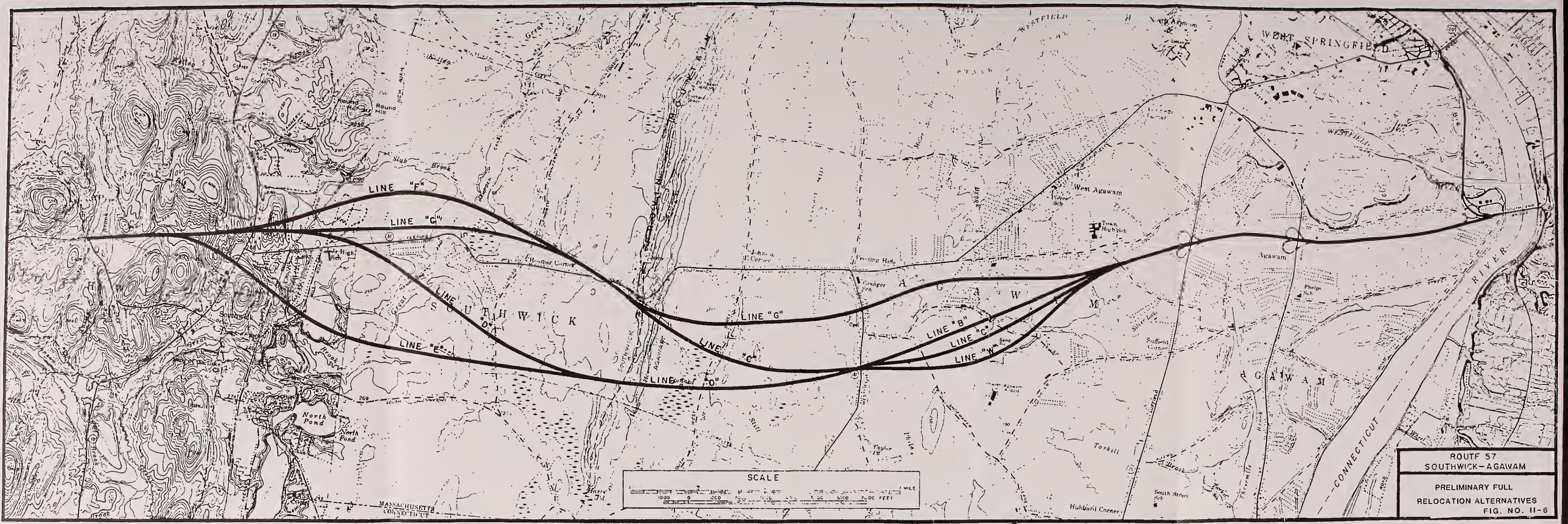


COMMONWEALTH OF MASSACHUSETTS
DEPARTMENT OF PUBLIC WORKS

ROUTE 57 RELOCATION

DISMISSED ALTERNATIVES

FIG. NO. II-5


LINE "F"
LINE "G"
LINE "D"
LINE "E"
LINE "G"
LINE "C"
LINE "B"
LINE "W"
LINE "D"
SOUTHWICK
AGAWAM
WEST SPRINGFIELD
WESTFIELD
CONNECTICUT RIVER
MASSACHUSETTS
CONNECTICUT
SCALE
1000 0 2000 4000 6000 8000 FEET
1 MILE
ROUTE 57
SOUTHWICK–AGAWAM
PRELIMINARY FULL
RELOCATION ALTERNATIVES
FIG. NO. II-6

III. TRAFFIC

A. METHODOLOGY

The traffic study area encompasses the Route 57 corridor, beginning at South Westfield Street and extending just across the Agawam/Southwick Town Line.

Automatic traffic recorder counts were taken at 22 locations from Tuesday, August 16, 1988 to Thursday, August 18, 1988. Manual counts were conducted during the months of July and August at 16 intersections between the hours of 7:00 to 9:00 AM and 4:00 to 6:00 PM.

Future traffic volumes are identical for Alternatives III and IV due to the similarity in their location, operational characteristics and levels of service. Similarly, future traffic volumes are identical for Alternatives III(a) and IV(a) with the option of a grade separated crossing at South West Street and Relocated Route 57.

Intersection Levels of Service were calculated using the Federal Highway Administration's Highway Capacity Software based on the methodology of the Highway Capacity Manual, 1985.

Traffic volume projections and analyses included in this Report are based on the premise that the Phase I segment of the Relocation of Route 57 will be constructed and operational as of 1993.

The construction of the Route 57 Relocation is expected to result in a small amount of induced and diverted traffic in the corridor. It is estimated that Alternatives III and IV would attract approximately 2,200 trips per day in 1993.

Existing traffic signal timings were used to calculate existing Levels of Service. Calculated Levels of Service were then compared to existing to verify the methodology. Future Levels of Service were determined using the same adjustment factors except that traffic signal timing was adjusted to optimize Levels of Service for altered traffic patterns.

B. TRAFFIC VOLUMES

Traffic volumes for 1988 Conditions and for the No Build Alternative and Alternatives III, III(a), IV, and IV(a) in 1993 and 2013 are summarized in Figures III-1 through III-7.

Under 1988 Conditions, Southwick Street between South West Street and South Westfield Street carries approximately 13,800 vehicles per day. Changes in background traffic cause this volume to increase by 7 percent to 14,800 vehicles by 1993, and by 51 percent to 20,800 vehicles by 2013. Comparable changes would occur on South West and South Westfield Streets. These increases are attributable to increases in background traffic and to changes in traffic circulation caused by opening Phase I of the Route 57 Relocation Project to traffic.

Under any build alternative, through traffic will be diverted to the new highway, noticeably reducing daily and peak hour traffic volumes on Southwick Street. Comparing the 24 hour traffic volumes on Southwick Street between South West and Southwick Streets, the traffic volumes under the Alternatives III and IV will decrease by 64 percent versus the volume under the No Build Alternative in 1993, from 14,800 to 5,300. The corresponding decrease will be 66 percent in 2013 from 20,800 to 7,050. The decreased traffic volumes will alleviate the operational and safety problems along the existing Route 57 corridor.

Because no access ramps are provided at South West Street under Alternatives III(a) and IV(a), existing Route 57, South West Street, and South Westfield Street would carry slightly higher traffic volumes in order to accommodate these local circulation trips. The 24 hour traffic volume on Southwick Street between South West and South Westfield Streets would be 6,000 under Alternative III(a) and IV(a) versus 5,300 under Alternatives III and IV in 1993; and 8,000 versus 7,050 in 2013.

In 1993, the 24 hour traffic volume on Relocated Route 57 is forecast to be 12,200 to the east of South West Street and 9,150 to the west of South West Street. In 2013, the 24 hour traffic volume on Relocated Route 57 is forecast to be 18,550 to the east of South West Street and 14,650 to the west.

C. UPDATED TRAFFIC COUNTS

The traffic volumes included in this Report are primarily based on traffic counts taken in 1988. To verify that the 1988 traffic count data and the projections developed from them are representative of 1992 conditions, new manual turning movement counts and Automatic Traffic Recorder (ATR) counts were taken in 1992.

Manual turning movement counts were taken at the intersections of Southwick Street and South West Street on June 2, 1992 and at the intersections of South Westfield Street with Southwick Street and with Shoemaker Lane on May 21 and 22, 1992. ATR counts in the vicinity of South West Street were taken on June 2, 1992. ATR counts in the vicinity of South Westfield Street were taken between May 18, and May 20, 1992.

Average Annual Daily Traffic volumes were calculated by applying axle and monthly adjustment factors. The observed annual change in traffic volumes are compared with the forecast annual change in traffic volumes for the period 1993 to 2013 in Table III-1. Comparison of the 1992 traffic counts with the volumes obtained by interpolating between the 1988 and the 1993 No Build traffic volumes is not meaningful, because the 1993 projections incorporate traffic reassignments based upon opening Phase I of the Route 57 Relocation to traffic.

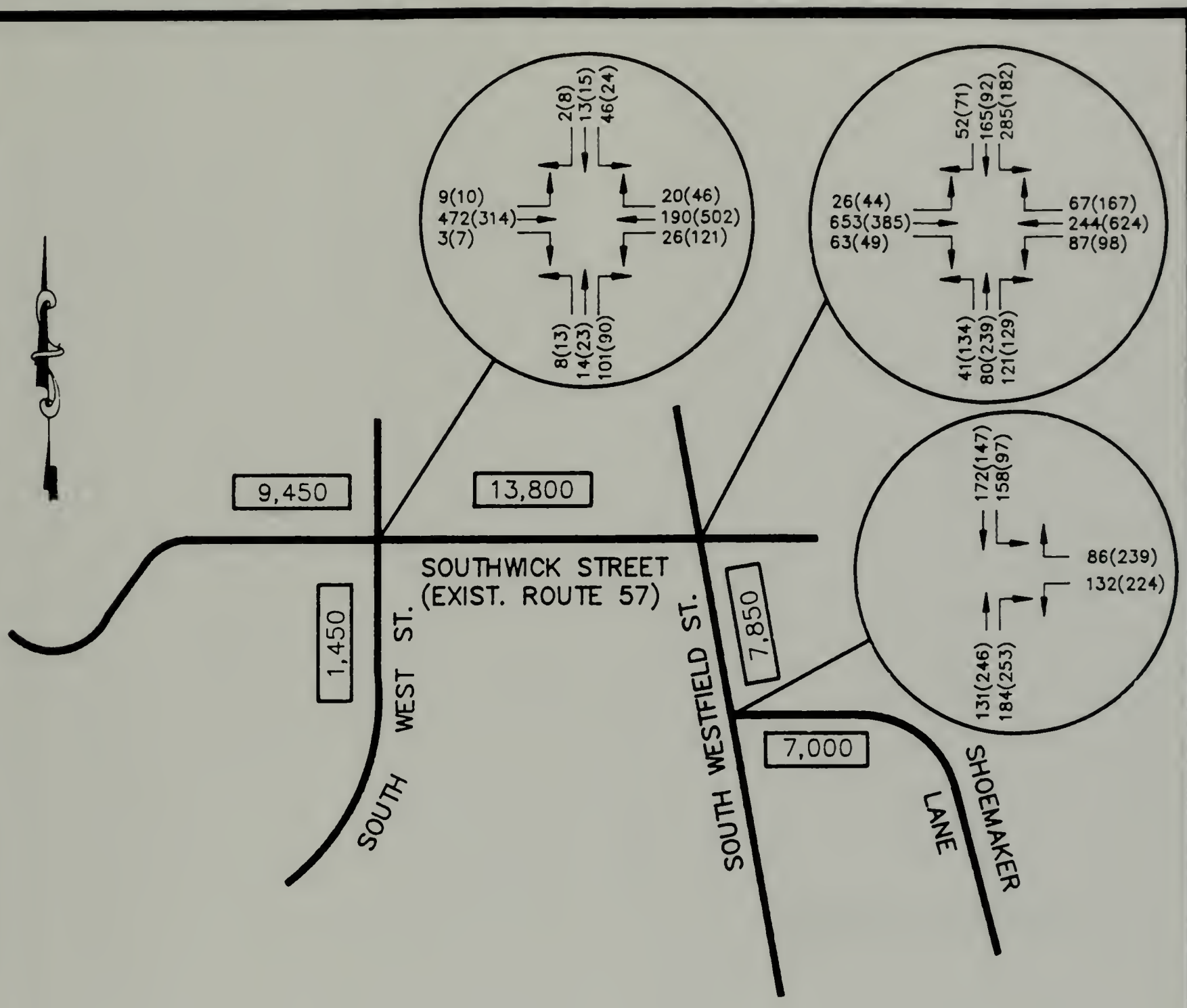
The increases observed in traffic volumes between 1988 and 1992 are generally consistent with the "Growth Factors" used in developing the projections of future traffic volumes for this Report. In certain locations, the observed increases are somewhat larger than the projected increases, which emphasizes the need to continue the Relocation of Route 57. The only location where the observed increase in traffic is noticeably less than the projected increase is the ADT volume on Southwick Street west of South West Street. This may be a reporting error as this decrease is not reflected in the manual turning movement counts taken at this location.

TABLE III-1

TRAFFIC VOLUME SUMMARY

	1988 Traffic Volumes	1992 Traffic Volumes	Observed Annual Change 1988-1992 (Percent)	Projected Annual Change 1993-2013 (Percent)
Southwick Street West of South West Street				
Two Way ADT	11,000	9,400	-3.8	2.0
Two Way AM Peak Hour Volume	684	815	4.4	2.0
Two Way PM Peak Hour Volume	854	917	3.2	2.0
Southwick Street East of South West Street				
Two Way ADT	11,100	12,900	3.8	1.7
Two Way AM Peak Hour Volume	855	965	3.1	1.9
Two Way PM Peak Hour Volume	1,097	1,186	2.0	1.9
Southwick Street West of South Westfield Street				
Two Way ADT	N/A	N/A	N/A	N/A
Two Way AM Peak Hour Volume	1,078	1,111	0.8	1.8
Two Way PM Peak Hour Volume	1,307	1,432	2.3	1.8
Southwick Street East of South Westfield Street				
Two Way ADT	N/A	N/A	N/A	N/A
Two Way AM Peak Hour Volume	1,477	1,591	1.9	1.4
Two Way PM Peak Hour Volume	1,585	1,741	2.4	1.3
South West Street South of Southwick Street				
Two Way ADT	2,900	3,250	2.9	2.5
Two Way AM Peak Hour Volume	165	184	2.8	2.6
Two Way PM Peak Hour Volume	269	278	0.8	1.3
South Westfield Street South of Southwick Street				
Two Way ADT	7,250	8,400	3.8	1.9
Two Way AM Peak Hour Volume	556	667	4.7	2.0
Two Way PM Peak Hour Volume	741	882	4.5	2.0
South Westfield Street North of Shoemaker Lane				
Two Way ADT				
Two Way AM Peak Hour Volume	547	591	2.0	2.0
Two Way PM Peak Hour Volume	729	855	4.1	2.0

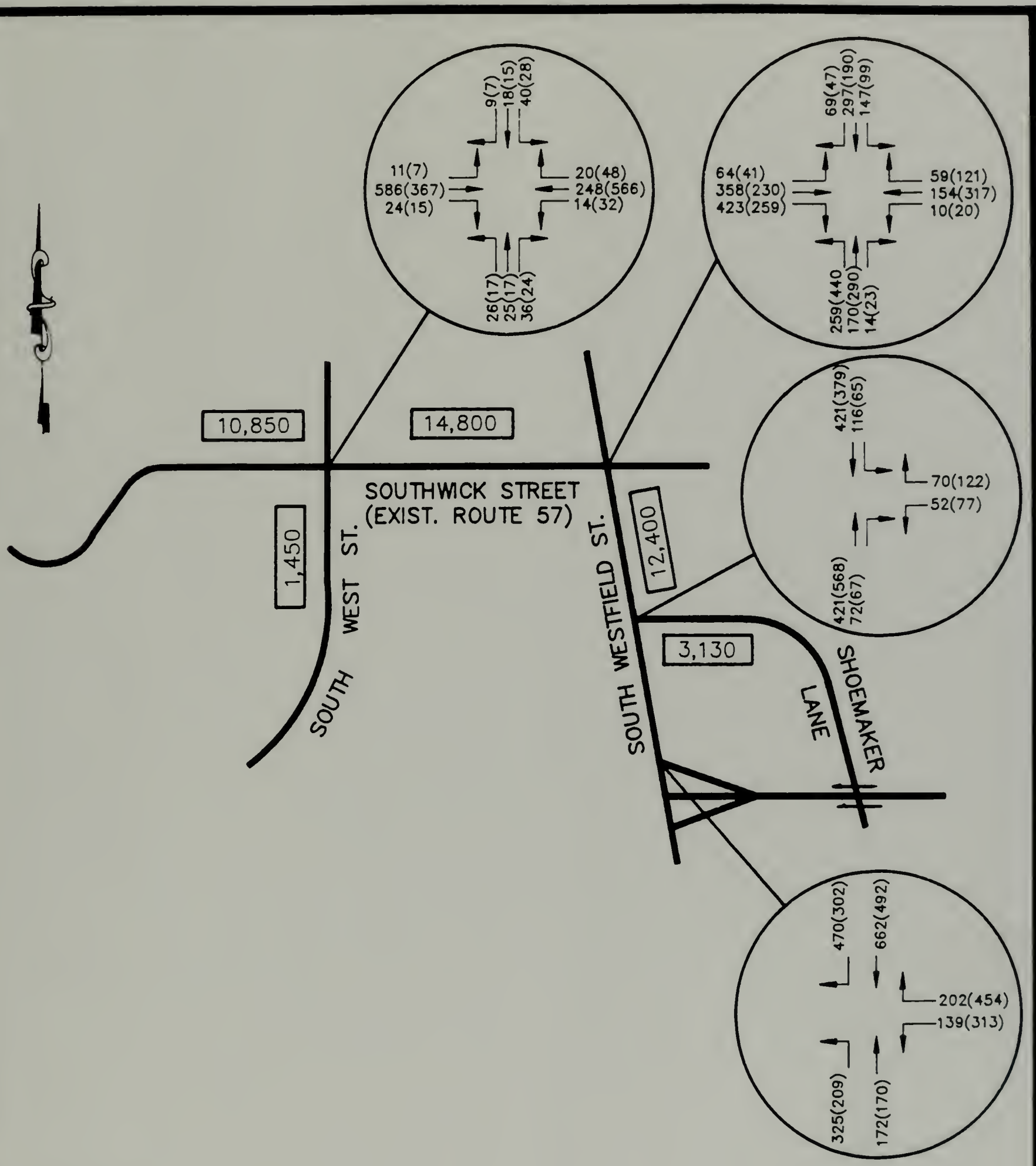
THIS PAGE INTENTIONALLY LEFT BLANK



00,000 24 HOUR VOLUME

000 (000) A.M. PEAK VOL. (P.M. PEAK VOL.)

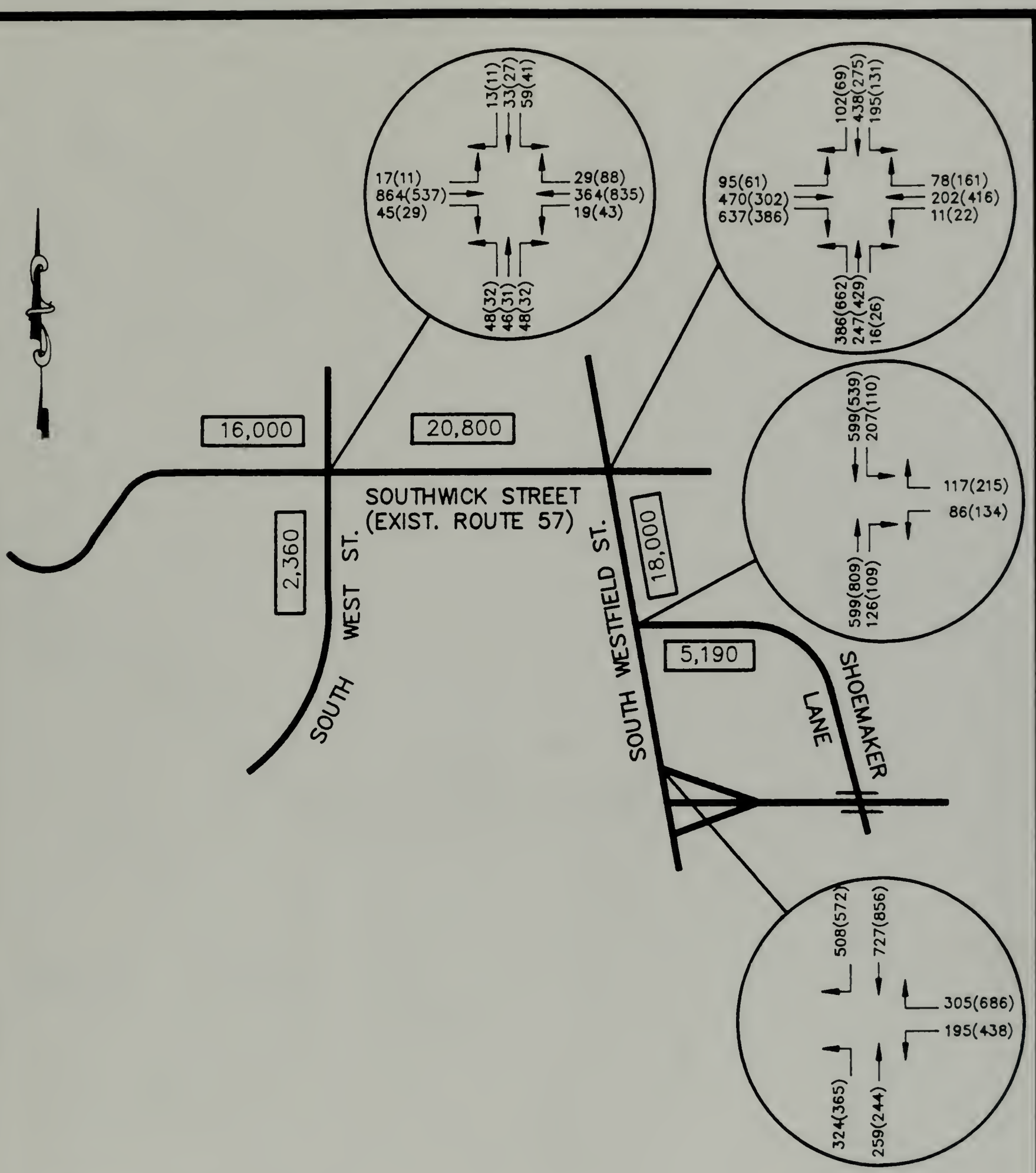
ROUTE 57 RELOCATION AGAWAM AND SOUTHWICK MASSACHUSETTS	1988 TRAFFIC VOLUMES EXISTING CONDITIONS	III-1 FIGURE



00,000 24 HOUR VOLUME

000 (000) A.M. PEAK VOL. (P.M. PEAK VOL.)

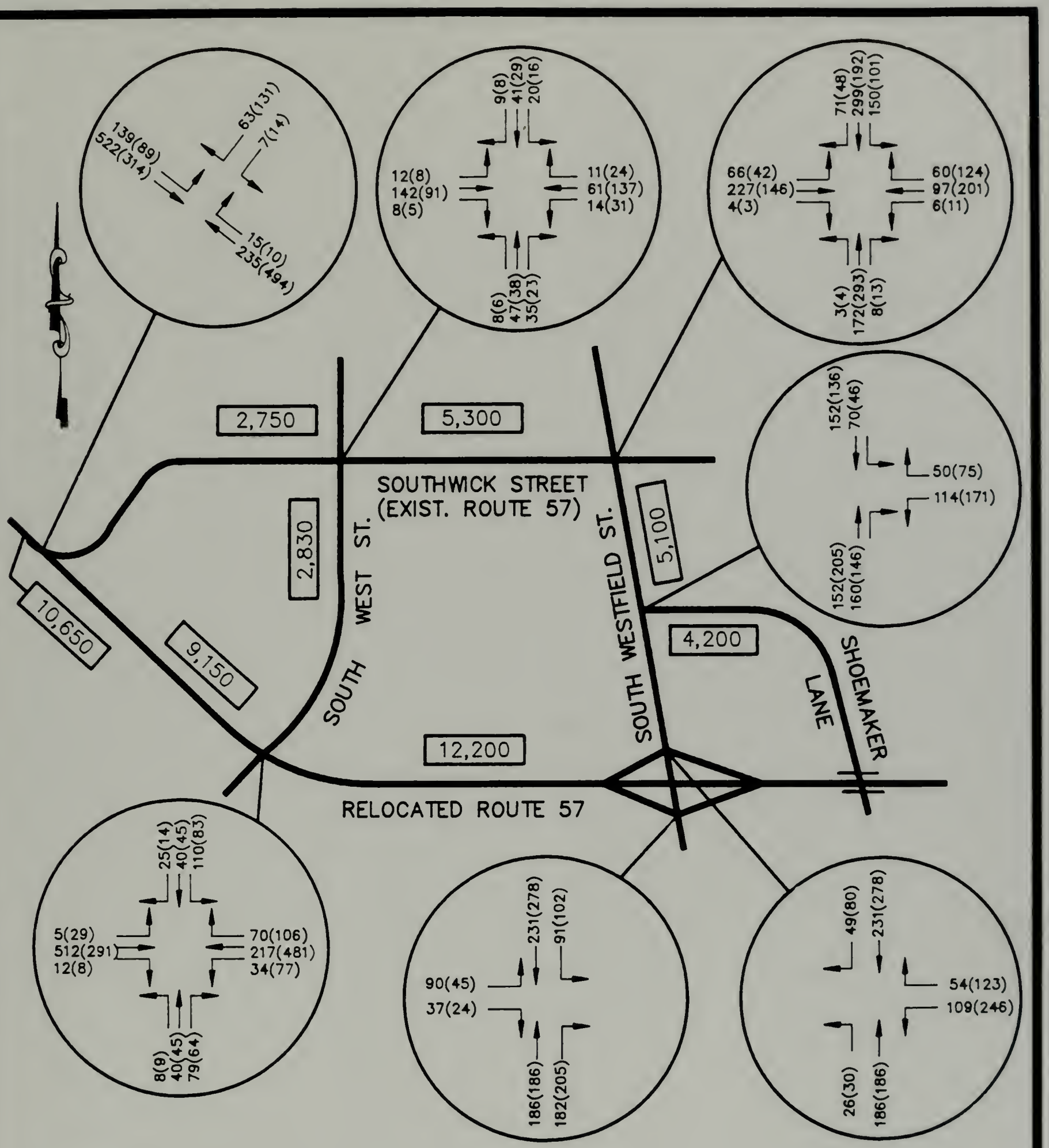
ROUTE 57 RELOCATION AGAWAM AND SOUTHWICK MASSACHUSETTS	1993 TRAFFIC VOLUMES NO BUILD ALTERNATINE I	III-2 FIGURE



00,000 24 HOUR VOLUME

000 (000) A.M. PEAK VOL. (P.M. PEAK VOL.)

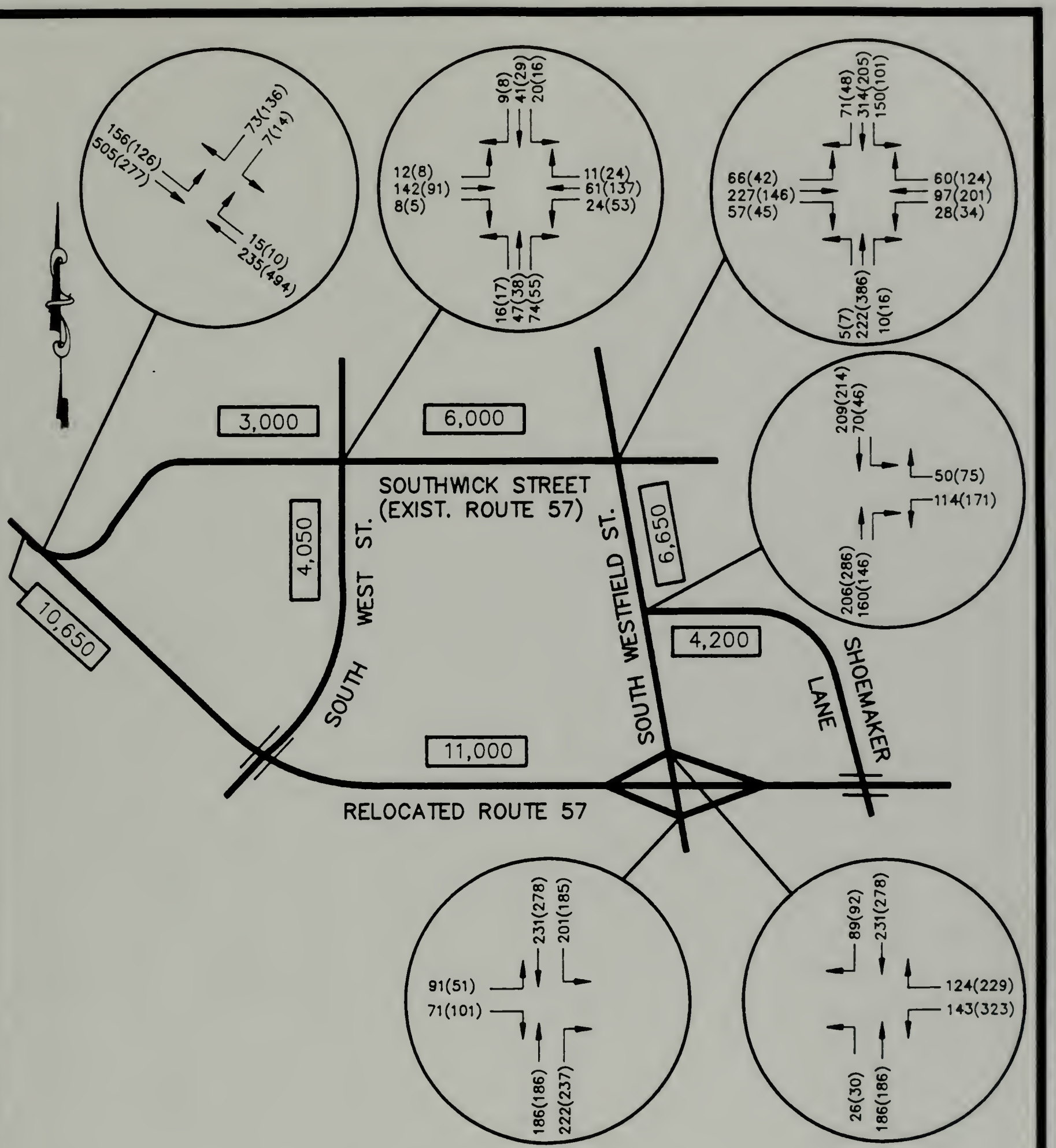
ROUTE 57 RELOCATION AGAWAM AND SOUTHWICK MASSACHUSETTS	2013 TRAFFIC VOLUMES NO BUILD ALTERNATIVE I	III-3 FIGURE



00,000 24 HOUR VOLUME

000 (000) A.M. PEAK VOL. (P.M. PEAK VOL.)

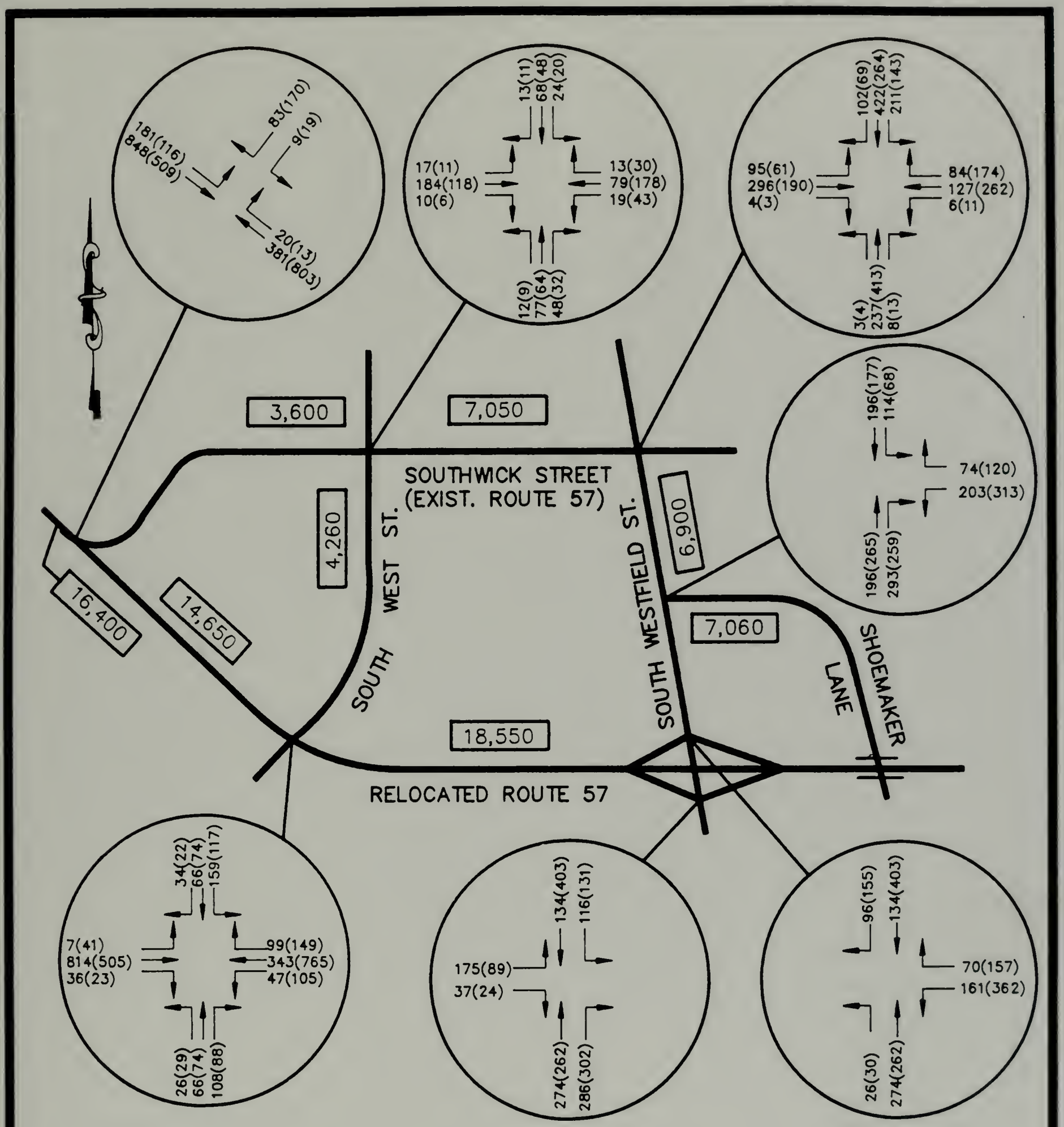
ROUTE 57 RELOCATION AGAWAM AND SOUTHWICK MASSACHUSETTS	1993 TRAFFIC VOLUMES ALTERNATIVES III & IV	III-4 FIGURE



00,000 24 HOUR VOLUME

000 (000) A.M. PEAK VOL. (P.M. PEAK VOL.)

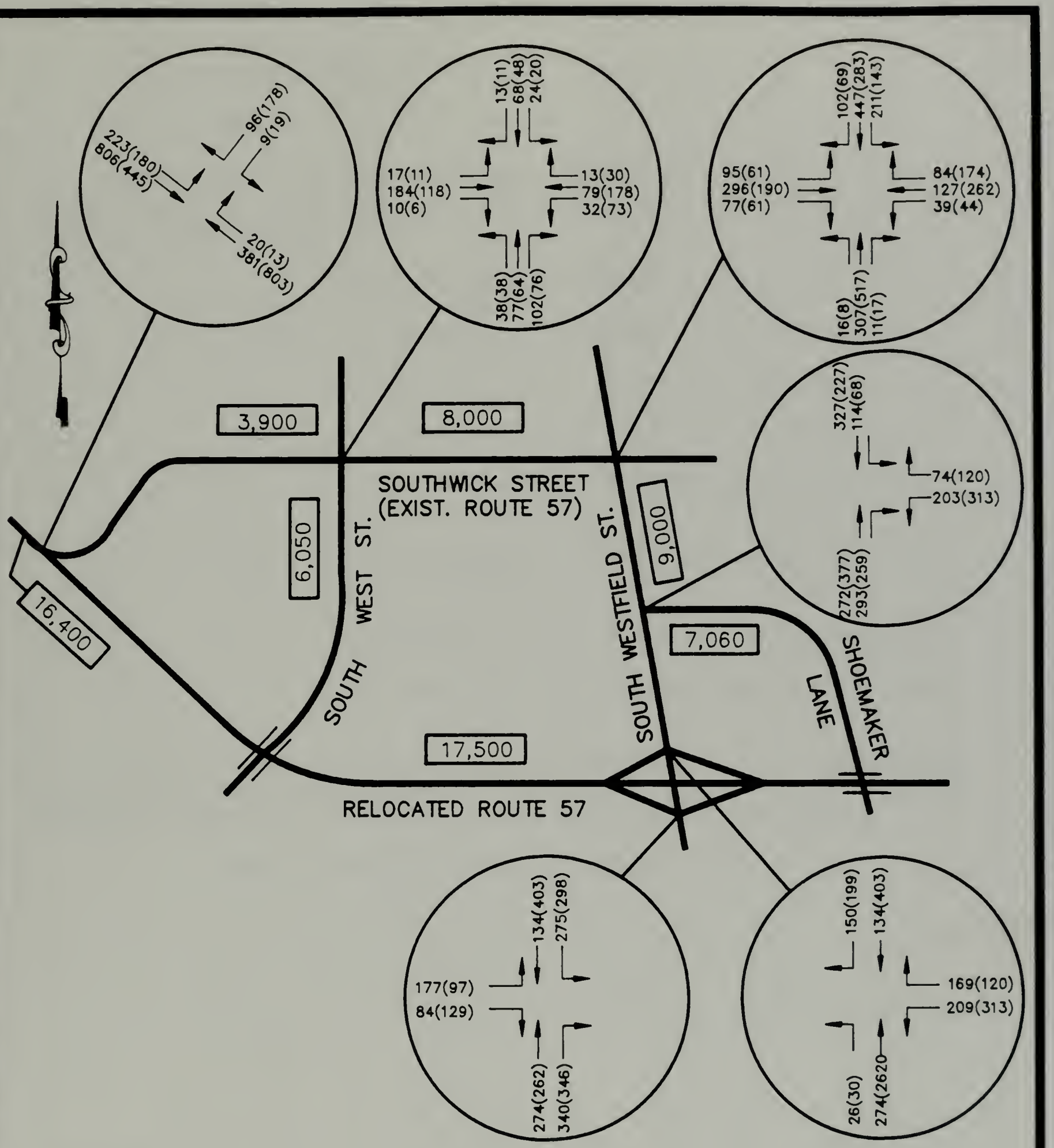
ROUTE 57 RELOCATION AGAWAM AND SOUTHWICK MASSACHUSETTS	1993 TRAFFIC VOLUMES ALTERNATIVES IIIa & IVa	III-5 FIGURE



00,000 24 HOUR VOLUME

000 (000) A.M. PEAK VOL. (P.M. PEAK VOL.)

ROUTE 57 RELOCATION AGAWAM AND SOUTHWICK MASSACHUSETTS	2013 TRAFFIC VOLUMES ALTERNATIVES III & IV	III-6 FIGURE



00,000 24 HOUR VOLUME

000 (000) A.M. PEAK VOL. (P.M. PEAK VOL.)

ROUTE 57 RELOCATION AGAWAM AND SOUTHWICK MASSACHUSETTS	2013 TRAFFIC VOLUMES ALTERNATIVES IIIa & IVa	III-7 FIGURE

D. LEVEL OF SERVICE

1. Definition

Level of Service is a measure of the quality of flow and overall congestion on a particular section of road or at a specific intersection. Levels of Service are generally defined in the Highway Capacity Manual as follows:

LEVEL OF SERVICE RATINGS

Rating	Description	Traffic
A	Free Flow	Drivers feel no restriction
B	Stable Flow	Drivers feel some restriction
C	Stable Flow	Drivers feel somewhat restricted but not objectionably so
D	Approaching Unstable Flow	Increasing restriction and congestion
E	Capacity	Substantial restriction and delays
F	Forced Flow	Jammed conditions, extreme delays

Intersection delay criteria have been established by the 1985 Highway Capacity Manual, Special Report 209 in order to measure Level of Service at signalized and unsignalized intersections. The following Table outlines the criteria for each condition:

LEVEL OF SERVICE CRITERIA AT INTERSECTIONS

	Signalized	Unsignalized
Rating	Stopped Delay Per Vehicle (Sec)	Reserve Capacity (Passenger Cars Per Hour)
A	5.0 or Less	400 or More
B	5.1 or 15.0	300 - 399
C	15.1 or 25.0	200 - 299
D	25.1 or 40.0	100 - 199
E	40.1 or 60.0	0 - 99
F	Greater than 60.0	0

2. Level of Service - 1988 Condition

Existing (year 1988) Levels of Service are summarized in Table III-2.

The intersections of Southwick and South Westfield Street and of Shoemaker Lane and South Westfield Street both experience operational problems. The capacity of these intersections is exceeded during the PM peak hour.

The signalized intersection of Southwick Street (existing Route 57) and North/South Westfield Street (Route 187) operates at Level of Service "C" during the weekday AM peak hour and at Level of Service "F" during the weekday PM peak hour. This location is characterized by heavy eastbound traffic flow in the morning and by heavy westbound traffic flow in the afternoon. In addition, there is a significant demand for southbound left turns from North Westfield Street, particularly during the AM peak hour.

The unsignalized intersection of Shoemaker Lane at South Westfield Street experiences moderate traffic flow. The analysis of left turn movements from Shoemaker Lane show a Level of Service "D" during the AM peak hour and Level of Service "F" during the PM peak hour. Vehicles generally form separate queues for left turn or right turn movements from Shoemaker Lane onto South Westfield Street. It was observed that only short delays were experienced by drivers undertaking right turn movements.

Presently, the signalized intersection of Southwick Street (existing Route 57) and North/South West Street operates at Level of Service "B" during the AM and PM peak hours, Level of Service "B" is characterized by little delay to the flow of traffic through the intersection.

TABLE III-2

INTERSECTION LEVEL OF SERVICE SUMMARY
EXISTING CONDITIONS

	Location	Year 1988 AM	PM
1.	No./So. West Street @ Southwick Street (Existing Route 57)	B	B
2.	No./So. Westfield Street (Route 187) at Southwick Street (Existing Route 57)	C	F
3.	Shoemaker Lane at South Westfield Street (Route 187) - Unsignalized Condition		
	SB Left on South Westfield Street	A	A
	WB Shoemaker Lane		
	Left	D	F
	Right	A	B

3. No Build Alternative I Level of Service

Future Levels of Service for No Build Alternative I are summarized in Table III-3.

Under the No Build Alternative, operational problems would occur at various locations in the project area, including the intersections of Southwick Street and South Westfield Street and of South Westfield Street and Shoemaker Lane. Operational problems and delays cause motorists to use local streets to bypass Southwick Street. Under the No Build Alternative, traffic volumes will increase by approximately 6,000 vehicles per day between 1993 and 2013, causing these operational and circulation problems to further deteriorate over time.

Under Alternative I, the intersection of Southwick Street and North/South West Street will operate at Level of Service "C" by the year 2013. General increases in traffic flow along Southwick Street by the year 2013 can be somewhat alleviated by adjustments to the existing signal timing to allow for a greater percentage of green time for the eastbound and westbound directions.

Altered traffic patterns along Southwick Street and North/South Westfield Street will result in a Level of Service "D" in 1993 for the signalized intersection of Southwick Street (existing Route 57) and North/ South Westfield Street. By the year 2013 increases in traffic flow will result in Level of Service "F" in both the AM and PM peak hours.

As part of the Phase I Route 57 Relocation, the intersection of South Westfield Street will be upgraded including widening and lengthening of the northbound left turn lane on South Westfield Street to provide greater capacity. In analyzing Levels of Service, these intersection improvements have been considered to be in place and operational by the year 1993. In addition, Levels of Service calculations have also included adjustments in signal timings for optimal signal operations.

Altered traffic patterns along Shoemaker Lane and South Westfield Street will result in the deterioration of the operation of the intersection to Level of Service "F" for left turn movements from Shoemaker Lane onto South Westfield Street during the PM Peak Hour by the year 1993 and during both the AM and PM peak hours by the year 2013. The analyses of Level of Service for this intersection are based upon implementation of the mitigation measures from Phase I Route 57 Relocation which consists of widening South Westfield Street to include a southbound left turn lane and widening Shoemaker Lane to provide separate right and left turn lanes. The projected traffic volumes, however, should reach a level that will satisfy "8 Hour Warrants" for the installation of traffic signals at this intersection by the year 2013. Provision of signalization would upgrade year 2013 operations to Level of Service "C" during AM peak hour. The intersection would continue to operate at capacity, Level of Service "E", during the PM peak hour.

The at-grade intersections to be constructed at the terminus of the Phase I Relocated Route 57 ramps at South Westfield Street (Route 187) were analyzed as two separate one-way facilities that would ultimately serve as the easterly exit/entrance ramps of the full diamond interchange proposed under the other Alternatives. The analysis was performed with the consideration that South Westfield Street (Route 187) would be widened in the vicinity of the intersection to allow for two southbound lanes (1 left turn, 1 thru) and a channelized northbound right turn lane onto eastbound Relocated Route 57.

The resulting Level of Service for the unsignalized condition indicates that left turn movements from the Relocated Route 57 ramp to southbound South Westfield Street (Route 187) will experience Level of Service "E" and "F" for the AM and PM peak hours respectively in 1993. By the year 2013, the analysis shows a Level of Service "F" during the AM and PM Peak Hours. The projected traffic volumes indicate that "8 Hour Warrants" for Traffic Signals will be met by the year 2000. Following provision of signalization, the intersection would operate at Level of Service "B" during both peak hours in 1993 and in 2013.

4. Build Alternatives III & IV Levels of Service

Future Levels of Service for the years 1993 and 2013 were analyzed for the Build Alternatives (Alternatives III and IV and for Alternatives III(a) and IV(a) with a grade separation at South West Street). These Levels of Service are summarized in Table III-3.

Construction of any of the Build Alternatives will lower traffic volumes on Southwick Street, resulting in significant improvements in levels of service.

The intersection of Southwick Street (existing Route 57) and North/ South West Street will operate at Level of Service "B" under all Build Alternatives during both peak hour periods through the year 2013.

Under all build alternatives, the reduced traffic volumes along Southwick Street and implementation of mitigation measures from Phase I will significantly upgrade operations at its intersection with North/South Westfield Street. Under the No Build Alternative, the capacity of this intersection is exceeded. Under all build alternatives, the intersection operates at Level of Service "B" during both peak hour periods in 1993 through the year 2013.

Projected development of the Westmass Industrial Park (formerly the Bowles/Agawam Airport) will result in continued moderate traffic volumes through the Shoemaker Lane/South Westfield Street intersection. Analysis of the critical left turn movements from Shoemaker Lane onto South Westfield Street indicate a Level of Service "C" for the 1993 AM peak hour under all build alternatives. This movement would operate at Levels of Service "D" and "F" for the PM peak hours under Alternatives III/IV and Alternatives III(a)/IV(a) respectively. By 2013, operations will deteriorate, with Levels of Service "D" and "F" occurring during the AM peak hour under Alternative III and IV, respectively. Under Alternative III(a) and IV(a), the intersection would operate at Level of Service "F" during both peak hours. The projected traffic volumes will reach a level to satisfy "Warrants" for traffic signals by the year 2000.

The proposed full diamond interchange at South Westfield Street and Relocated Route 57 was analyzed for the unsignalized condition. The results of the analysis indicate that eastbound and westbound left turn movements along the Relocated Route 57 ramps will reach Level of Service "F" by the year 2013 during both the AM and PM peak hours for all build alternatives. The projected traffic volumes indicate that "8 Hour Warrants" for traffic signals will be met by the year 2013 for the westbound left turn ramp approach only.

If a traffic signal system were to be provided, operations would be upgraded resulting in an overall Level of Service "B" during the AM and PM peak hours for the year 2013. (Westbound Ramp Only or Coordinated Westbound and Eastbound Ramps)

The new signalized intersection at Relocated Route 57 and South West Street will operate at Level of Service "B" during the peak hour periods through the year 2013 under Alternatives III and IV. No intersection would be constructed under Alternatives III(a) and IV(a) since grade separation would be provided.

Under Alternative III, a new unsignalized "T" intersection of Relocated Route 57 and Southwick Street (existing Route 57) near the Agawam/Southwick Town Line will be constructed. Left turn movements from eastbound Route 57 onto Southwick Street would be allowed. Capacity analyses performed indicate this left turn movement will operate at Level of Service "A" during the AM peak hour and Level of Service "B" during the PM peak hour periods in 1993. By the year 2013, the Level of Service for this turn will be Level of Service "C" during the PM peak hour. It would operate at Level of Service "A" under Alternative III and Level of Service "B" under Alternative III(a) during the AM peak hour by the year 2013.

For both Alternative III and Alternative III(a), right turn movements at the Town Line from Southwick Street onto New Route 57 in 1993 will be Level of Service "A" and "C" respectively for the AM and PM peak hour periods. By 2013, this movement will operate at Level of Service "A" and "B" under Alternative III and III(a) respectively during the AM peak. By the year 2013 the Level of Service for this movement for all build alternatives will be Level "E" during the PM peak.

The projected left turn movements from Southwick Street onto New Route 57 at the Town Line will experience Level of Service "D" during the peak hour periods in 1993 and Level of Service "E" during the peak hours in the year 2013.

Under Alternative IV, the unsignalized "four way" intersection near the Town Line formed by Relocated Route 57 and Southwick Street will allow for left turn movements from Route 57 EB onto Southwick Street. This movement will operate at Level of Service "A" during the 1993 peak hours. Under Alternative IV(a), it will operate at Level of Service "A" during the AM peak hour and Level of Service "B" during the PM peak hour. By the year 2013, this movement will operate at Level of Service "B" in the AM peak hour and Level of Service "C" in the PM peak hour for Alternative IV and Alternative IV(a), respectively.

Right turn movements onto Relocated Route 57 from Southwick Street will be at Level of Service "A" and "C" for the 1993 AM and PM peak hours for Alternative IV and IV(a) respectively, and the 2013 AM peak hour. Level of Service for the 2013 AM peak hour will be "A" and "B" under Alternative IV and Alternative IV(a), respectively. The Level of Service for the 2013 PM peak hour will be "E" for Alternative IV and Alternative IV(a).

The turning and through movements from Southwick Street will operate at Level of Service "D" during the 1993 peak hours and Level of Service "E" for the peak hours by the year 2013.

5. Highway Level of Service

In addition to evaluating intersection operations, the Level of Service provided by the highway segments between intersections and interchanges was also evaluated using the procedures set forth in the Highway Capacity Manual. Factors influencing the level of service provided on a given segment of highway include the traffic volume, the number of travel lanes, and the geometric characteristics of the roadway, including grades and the width of lanes and shoulders.

Under Alternatives III and IV, the four lane limited access segment of Relocated Route 57 east of South West Street will operate at Level of Service "C" during the morning and evening peak hours in both 1993 and 2013. Level of Service "C" is considered an acceptable "design condition".

Relocated Route 57 roadway transitions from four travel lanes to two travel lanes and a climbing lane for trucks west of South West Street. Because traffic diminishes towards the western end of the corridor, the two lane segment of Route 57 west of South West Street will also operate at Level of Service "C" during the morning and evening peak hours in both 1993 and 2013.

TABLE III-3
INTERSECTION LEVEL OF SERVICE SUMMARY
ALTERNATIVES I, III, III(a), IV, IV(a)

Location	No Build Alt. I Yr. 1993 AM	PM	Alts. III & IV Yr. 1993 AM	PM	Alts IIIa & IVa Yr. 1993 AM	PM	No Build Alt. I Yr. 2013 AM	PM	Alts. III & IV Yr. 2013 AM	PM	Alts. IIIa & IVa Yr. 2013 AM	PM
1. No./So. West St. @ Southwick St. (Existing Route 57) B	B	B	B	B	B	C	C	B	B	B	B	
2. No./So. Westfield Street (Route 187) at Southwick Street (Existing Route 57)	D	D	B	B	B	B	F	F	B	B	B	B
3. Shoemaker Lane at South Westfield Street (Rt. 187) - Unsignalized Condition												
SB Left on South Westfield St.	D	A	A	A	A	A	C	C	A	A	A	A
WB Shoemaker Lane												
Left	F	E	C	D	C	E	F	F	D	F	F	F
Right	A	C	A	A	A	A	C	F	B	A	A	A
Proposed Signalized Condition	-	-	-	-	-	-	C	E	B	B	B	B
4. Relocated Route 57 at South Westfield Street (Rt. 187) - Unsignal. Condition												
NB Left on South Westfield St.	-	-	A	A	A	A	-	-	A	A	A	A
SB Left on South Westfield St.	A	A	A	A	A	A	A	A	B	C	B	C
WB Route 57 Off-Ramp												
Left	E	F	D	E	D	E	F	F	F	F	F	F
Right	A	A	A	A	A	A	A	A	A	A	A	A
Proposed Signalized Condition	-	-	B	B	B	B	B	C	B	B	B	B
EB Route 57 Off-Ramp												
Left	-	-	D	D	D	D	-	-	F	F	F	F
Right	-	-	A	A	A	A	-	-	A	A	A	A
Proposed Signalized Condition	-	-	B	B	B	B	-	-	B	B	B	B
5. Reloc. Rte. 57 @ South West St.	-	-	B	B	-	-	-	-	B	B	-	-
6. Reloc. Rte. 57 @ Exist. Rte 57 at Southwick Town Line - Unsignalized Condition												
EB Left on Reloc. Route 57	-	-	A	A	A	B	-	-	A	C	B	C
WB Turns on Old Route 57												
Left	-	-	D	D	D	E	-	-	E	E	E	E
Right	-	-	A	C	A	C	-	-	A	E	B	E

E. CONSTRUCTION IMPACTS

Highway construction projects will generate traffic during construction due to requirements to transport personnel, equipment, and materials. In particular, the proposed project will generate truck traffic due to the requirement to haul and dispose of surplus excavated materials.

There will be substantial excavation requirements in two locations, i.e. a hill west of South Westfield Street and near Provin Mountain at the Agawam/Southwick Town Line. The excess material that will have to be transported is estimated to be 440,000 cu. yd. under Alternative III and 160,000 cu. yd. under Alternative IV.

The type and capacity of trucks used to haul this material is typically left to the discretion of the construction contractor. Trucks used in roadway construction projects generally have capacities of 12 to 20 cubic yards. In order to estimate the number of trucks required to transport this material, a 20 cubic yard truck is selected.

To facilitate comparison, it is estimated that all trucks used to transport this material will have a capacity of 20 cu. yd. and that it will take 18 months to complete the excavation work. The estimated truck trips per day to haul the surplus excavated material is 47 under Alternative III and 21 under Alternative IV.

To mitigate any adverse impacts caused by the truck traffic, it is proposed that the construction contract documents include the following provisions:

- Prior to hauling to any waste disposal site, the Contractor shall submit the location, route and schedule along with an erosion control program and all permits for review and approval for each waste disposal site.

- To minimize potential impacts caused by fugitive dust, all trucks transporting earth be securely covered.

- Haul routes shall be specified with the goal of selecting routes with lower potential for impacting residential neighborhoods and other sensitive areas.

- If hauling and disposal east of the project area is proposed, the construction contract documents should, to the extent practicable, require use of the segments of Relocated Route 57 to minimize impacts on existing Route 57.

IV. AFFECTED ENVIRONMENT

A. TOPOGRAPHY

Much of the project area is flat to gently sloping, with a typical elevation in the vicinity of 200 feet above mean sea level. The eastern portion of the project area is characterized by wetlands and relatively flat farm fields which are typical of the Connecticut valley. In the western portion of the project area, approaching Provin Mountain, existing ground rises to an elevation of approximately 400 feet above mean sea level and slopes become steep.

B. WATER QUALITY

1. Background

The project area is located within the Lower Connecticut River basin and is drained by Still Brook and Philo Brook. These brooks generally flow southward to Suffield, CT and into the Connecticut River.

The Town of Agawam receives its drinking water supply from five draw points along the Springfield Water Department aqueduct and would not be affected by the Project. The Town of Agawam reports that 47 private wells are in operation. The nearest private wells are located on existing Route 57, west of South West Street. Private wells are also located within the White Fox Estates Subdivision off of South West Street, south of Leonard Pond and on Pine Street which intersects South Westfield Street, 1/2 mile south of the project area. These locations are not sensitive to activity within the project area.

2. Surface Water Sampling

Surface water sampling locations are indicated in Figure IV-1.

Samples were collected on October 20, 1988; June 30, 1989 and November 14, 1989 in the following locations: 1) Tuckahoe Turf Farm (Sampling #SW1, SW11, SW21); 2) Tuckahoe Turf Farm from a tributary flowing in the lower acreage (Sampling #SW2, SW12, SW22); 3) Leonard Pond where Spear Pepper Farm Road crosses Leonard Pond (Sampling #SW3, SW13, SW23); 4) Tributary feeding Spear Farm irrigation pond (Sampling #SW4, SW14, SW24); 5) Outfall Stream below the Boglisch Tree Nursery irrigation pond (Sampling #SW5, SW15, SW25); and 6) an unnamed stream just below the abandoned Quarry on the western stream side of Provin Mountain in Southwick (Sampling #SW6, SW16, SW26).

Two additional surface water locations were included during the November 14, 1989 sampling round; Location No. 7 the West tributary of Still Brook just west of South West Street (Sampling #SW27) and Location No. 8 the Convergence of the east and west tributaries of Still Brook and the outfall from Leonard Pond (Sampling #SW28).

Surface water samples collected at the eight (8) designated locations were analyzed for some or all of the following parameters: Temperature, pH, Heavy Metals (Ba&Ca), Dissolved Sodium (Na), Dissolved Chlorides (C1), Ammonia (NH3), Total Suspended Solids (TSS), Petroleum Hydrocarbons (PHC), and Biochemical Oxygen Demand (BOD).

Surface water sample results are presented in Table IV-1.

The Massachusetts Department of Environmental Protection (DEP), classifies surface water quality in the following categories: Class "A", waters acceptable as a source of public water supply; Class "B", waters acceptable for bathing and water contact recreation; and Class "C", waters acceptable as fish and wildlife habitat, certain agricultural and industrial use and aesthetic values.

Surface waters located in the project area can be categorized as Class "B" waterways or higher. [1] EPA standards for freshwater aquatic life were also used to evaluate surface water quality in the project area. Regulatory Standards are also shown in Table IV-1.

In general, surface water quality sample results reported for the project area exhibited acceptable surface water quality for the above parameters. Three samples (#SW12, SW23, and SW25) exhibited levels which exceeded acceptable surface water quality standards.

During the June 30, 1989 sampling round, sample #SW12 (Tuckahoe Turf Farm Tributary) exhibited an ammonia level (NH3) of 0.1 mg/l which exceeds the EPA standard for freshwater aquatic life of 0.02 mg/l (1976). A second sampling round conducted on November 14, 1989 reported no detection of ammonia. The ammonia level exhibited during the initial sampling round may be attributable to fertilizer runoff.

Samples #SW23 (Leonard Pond) and #SW25 (Boglisch Tree Nursery) taken on November 14, 1989 exhibited slightly low levels of pH at 5.88 and 6.29 respectively. The Massachusetts pH standard for a Class "B" surface water body ranges from a pH of 6.5 - 8.0. Prior sampling on June 30, 1989 reported pH levels within acceptable levels in both areas. In general, pH levels fluctuate as a result of temperature change, precipitation, natural organics and suspended sediments.

[1] U.S. Department of Transportation, Federal Highway Administration, and the Massachusetts Highway Department, Transportation Improvements to Route 57 Southwick-Agawam, 1979).

TABLE IV-3

SURFACE WATER QUALITY SAMPLE RESULTS

LOCATION	PARAMETERS (mg/l, except as noted)	SAMPLE DATES & TEST RESULTS 10/20/88	06/30/89	11/14/89	REGULATORY STANDARDS EPA (Red Book)	MA DEP (Cl.B Waters)
1) Tuckahoe Turf Farm (Samples SW1, SW11 & SW21)	pH	-	7.48	6.9	NA	6.5 - 8.0
	Ba	0.04	0.05	0.06	NA	NA
	Ca	-	32	31	NA	NA
	Na	15	12	12	NA	NA
	C1	34	26	25	NA	NA
	NH3	-	ND	ND	0.02	NA
	Temp.(F)	40 - 45	-	46.4	NA	65
	TSS	6	9	6	*	NA
	PHC	ND	ND	0.28	NA	NA
	BOD	<2	BDL	<5	NA	NA
2) Turf Farm Tributary (Samples SW2, SW12 & SW22)	pH	-	7.68	7.06	NA	6.5 - 8.0
	Ba	0.03	0.08	0.06	NA	NA
	Ca	-	35	28	NA	NA
	Na	5.8	12	9 9	NA	NA
	C1	16	22	15	NA	NA
	NH3	-	0.1	ND	0.02	NA
	Temp.(F)	40 - 45	-	48.6	NA	65
	TSS	ND	11	6	*	NA
	PHC	ND	ND	0 05	NA	NA
	BOD	11	BDL	<5	NA	NA

NOTES

BDL = Below Detection Limit
ND = Not Detected
- = Not Tested For
NA = Not Applicable
* = 10% reduction of the compensation point for phytosynthetic activity for aquatic life

TABLE IV-3 (CONT'D)

SURFACE WATER QUALITY SAMPLE RESULTS

LOCATION	PARAMETERS (mg/l, except as noted)	SAMPLE DATES & TEST RESULTS 10/20/88	06/30/89	11/14/89	REGULATORY STANDARDS EPA (Red Book)	MA DEP (Cl.B Waters)
3) Leonard Pond	pH	-	6.66	5.88	NA	6.5 - 8.0
(Samples SW3, SW13 & SW23)	Ba	0.038	0.02	0.02	NA	NA
	Ca	-	16	13	NA	NA
	Na	6.8	11	7.8	NA	NA
	C1	18	24	21	NA	NA
	NH3	-	ND	ND	0.02	NA
	Temp.(F)	40 - 45	-	42.4	NA	65
	TSS	ND	22	4	*	NA
	PHC	0.02	ND	ND	NA	NA
	BOD	<2	BDL	<5	NA	NA
4) Spear Farm Pond	pH	-	7.31	6.54	NA	6.5 - 8.0
(Samples SW4, SW14 & SW24)	Ba	0.064	0.03	0.03	NA	NA
	Ca	-	18	18	NA	NA
	Na	13	14	18	NA	NA
	C1	28	30	34	NA	NA
	NH3	-	ND	ND	0.02	NA
	Temp.(F)	40 - 45	-	49.1	NA	65
	TSS	ND	10	4	*	NA
	PHC	0.07	ND	0.14	NA	NA
	BOD	<2	BDL	<5	NA	NA

NOTES:

BDL = Below Detection Limit
ND = Not Detected
- = Not Tested For
NA = Not Applicable
* = 10% reduction of the compensation point for phytosynthetic activity for aquatic life

TABLE IV-3 (CONT'D)

SURFACE WATER QUALITY SAMPLE RESULTS

LOCATION	PARAMETERS (mg/l, except as noted)	SAMPLE DATES & TEST RESULTS 10/20/88	06/30/89	11/14/89	REGULATORY STANDARDS EPA (Red Book)	MA DEP (Cl.B Waters)
5) Boglish Nursery (Samples SW5, SW15 & SW25)	pH	-	7.54	6.29	NA	6.5 - 8.0
	Ba	0.02	0.03	0.03	NA	NA
	Ca	-	19	20	NA	NA
	Na	2.7	18	18	NA	NA
	C1	ND	39	49	NA	NA
	NH3	-	ND	ND	0.02	NA
	Temp.(F)	40 - 45	-	46.4	NA	65
	TSS	12	11	6	*	NA
	PHC	0.45	ND	0.16	NA	NA
	BOD	<2	BDL	<5	NA	NA
6) Quarry Stream (Samples SW6, SW16 & SW26)	pH	-	7.26	6.46	NA	6.5 - 8.0
	Ba	0.12	ND	ND	NA	NA
	Ca	-	15	14	NA	NA
	Na	4.5	ND	2.7	NA	NA
	C1	16	ND	ND	NA	NA
	NH3	-	ND	ND	0.02	NA
	Temp.(F)	40 - 45	-	51.8	NA	65
	TSS	6	8	4	*	NA
	PHC	ND	ND	0.11	NA	NA
	BOD	3.1	BDL	<5	NA	NA

NOTES:

BDL = Below Detection Limit
ND = Not Detected
- = Not Tested For
NA = Not Applicable
* = 10% reduction of the compensation point for phytosynthetic activity for aquatic life

TABLE IV-3 (CONT'D)

SURFACE WATER QUALITY SAMPLE RESULTS

LOCATION	PARAMETERS (mg/l, except as noted)	SAMPLE DATES & TEST RESULTS 10/20/88	06/30/89	11/14/89	REGULATORY STANDARDS EPA (Red Book)	MA DEP (Cl.B Waters)
7) Still Brook West Tributary (Sample SW7)	pH	-	-	6.97	NA	6.5 - 8.0
	Ba	-	-	0.05	NA	NA
	Ca	-	-	30	NA	NA
	Na	-	-	10	NA	NA
	C1	-	-	22	NA	NA
	NH3	-	-	ND	0.02	NA
	Temp.(F)	-	-	53.6	NA	65
	TSS	-	-	2	*	NA
	PHC	-	-	0.05	NA	NA
	BOD	-	-	44.4	NA	NA
8) Convergence E & W Tributary	pH	-	-	6.88	NA	6.5 - 8.0
	Ba	-	-	0.03	NA	NA
	Ca	-	-	20	NA	NA
	Na	-	-	7.9	NA	NA
	C1	-	-	15	NA	NA
	NH3	-	-	ND	0.02	NA
	Temp.(F)	-	-	45.5	NA	65
	TSS	-	-	6	*	NA
	PHC	-	-	0.06	NA	NA
	BOD	-	-	<5	NA	NA

NOTES:

BDL = Below Detection Limit
ND = Not Detected
- = Not Tested For
NA = Not Applicable
* = 10% reduction of the compensation point for phytosynthetic activity for aquatic life

C. FLOODPLAINS

There are two types of floodplains in the project area, i.e. floodplains delineated by the Flood Insurance Administration (FIA) of the Federal Emergency Management Agency (FEMA) which are protected under Executive Order 11988 and floodplains determined by hydrologic analysis at stream crossings which are protected under the Massachusetts Wetlands Protection Act (M.G.L., c.131, s.40).

As indicated in Figure V-1, there are six floodplain areas along the Route 57 corridor, located at stream crossings, which are subject to inundation during the 100 year frequency storm event.

One of these six locations is an unnamed tributary of Still Brook which is included on the FIA's Floodplain Map of the Town of Agawam. The limits of flooding were established by FIA using approximate methods and flood surface elevations are not available. The other five floodplain locations are not included on the official FIA Map, but have been determined to be flooded during the 100 year frequency storm by hydraulic analysis.

The proposed project will require funding from the Federal Highway Administration (FHWA) and will require a Section 404 Permit from the U.S. Army, Corps of Engineers (USACOE). These Federal agencies are bound by the Provisions of Executive Order 11988, which mandates protection of floodplains. All actions taken by Federal Agencies must be consistent with the provisions of Executive Order 11988.

The proposed project will require an Order of Conditions or a Superceding Order of Conditions pursuant to the requirements of the Massachusetts Wetlands Protection Act (M.G.L., c.131, s.40), "the Act". The Act mandates protection of all 100 year floodplains, i.e. those delineated on official FIA maps and those established through site specific hydraulic calculations.

D. WETLANDS

1. Background

The identification and evaluation of wetland resources in this Report have been conducted under two separate methodologies consistent with respective Federal and State procedures. Subsection 2 discusses the methods established by the Federal Manual for Identifying and Delineating Jurisdictional Wetlands used in assessing the limits of "waters of the United States": Subsection 3 discusses the methods established by the Massachusetts Department of Environmental Protection (DEP) in their regulations (310 CRM 10.00) implementing the Massachusetts Wetland Protection Act (M.G.L. c.131, s.40).

The wetlands within the project area are indicated in Figure IV-2. The limits of wetlands established using State and Federal criteria are similar throughout the project area.

2. Federal Clean Water Act

Wetlands in the project area are subject to regulation by the United States Army, Corps of Engineers (USACE) under Section 404 of the Clean Water Act. The placement of dredged or fill material into the "waters of the United States" or their bordering wetlands must be authorized by the USACE through the "404 Permit" process.

Section 404(c) of the Clean Water Act authorizes the U.S. Environmental Protection Agency (EPA) to prohibit or restrict filling of wetlands and other waters of the United States whenever it determines such discharge into an area would have an unacceptable adverse effect on wildlife, fishery or recreation areas. The EPA has published a draft map delineating the boundary of the 404(c) wetlands proposed for protection. This boundary encompasses the wetlands within the Leonard Pond watershed. EPA may proceed with formalizing this designation, particularly if filling or other actions are proposed adversely affecting these resources.

a. Definitions and Methodology

Wetlands are defined as "areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions" (Regulatory Programs of the USACE 33 CFR 328.3(b) and 40 CFR 230.3).

The wetland delineation for the project area was performed according to the methods prescribed in the Federal Manual for Identifying and Delineating Jurisdictional Wetlands. The USACE multiparameter approach, and implementing rules and regulations of the USACE 404 permit program, require positive indications for three criteria, (hydrophytic vegetation, hydric soils and wetland hydrology), for an area to be considered a wetland. Figure IV-2 indicates existing wetland resources as delineated by these criteria.

Technical supporting documentation on wetlands is presented in the Technical Appendix of this Report.

b. Wetland Evaluations

The wetland areas within the study area were defined to include the wetlands on both sides of the channel or body of water as well as contiguous wetlands within half a mile. The wetland areas are characterized by a high degree of interaction and interdependence (i.e. unconstricted movement and interchange of surface water). The boundaries for the areas were identified at points of hydrologic change, such as road crossings and geomorphic changes.

The functions and values of each wetland area were assessed by characterizing the chemical, biological and physical attributes and processes of the wetlands. Responses to questions based on field and office data are analyzed in a series of interpretation keys. A probability rating of low, moderate, or high was assigned to the individual functions and values. This qualitative rating is an estimate of the probability that a particular value or function will exist or occur in the wetland.

The functions and values of each wetland area were evaluated in terms of social significance, effectiveness and opportunity. Social significance assesses the value of a wetland to society in terms of its special designations, potential economic value, and strategic location. Effectiveness assesses the capability of a wetland to perform a function because of its physical, chemical or biological characteristics. Opportunity assesses the opportunity of a wetland to perform a function to its level of capability.

The evaluation consisted of the following functions and values: ground water discharge, ground water recharge, floodflow alteration, sediment stabilization, sediment/toxicant retention, nutrient removal/transformation, production export, wildlife diversity/abundance, aquatic diversity/abundance, uniqueness/heritage, and recreation. These wetland functions are rated in terms of social significance, effectiveness or opportunity.

Although recreation and uniqueness/heritage values were not evaluated in terms of effectiveness and opportunity, the areas are evaluated in terms of its value to society. The presence of intermittent, shallow, and poorly formed stream channels within the project area do not provide for recreational activities such as boating, fishing or swimming.

The characteristics of Federally defined wetlands within the project area, including their classification, total area, and area filled by each Build Alternative, are indicated in Table V-3 of this Report.

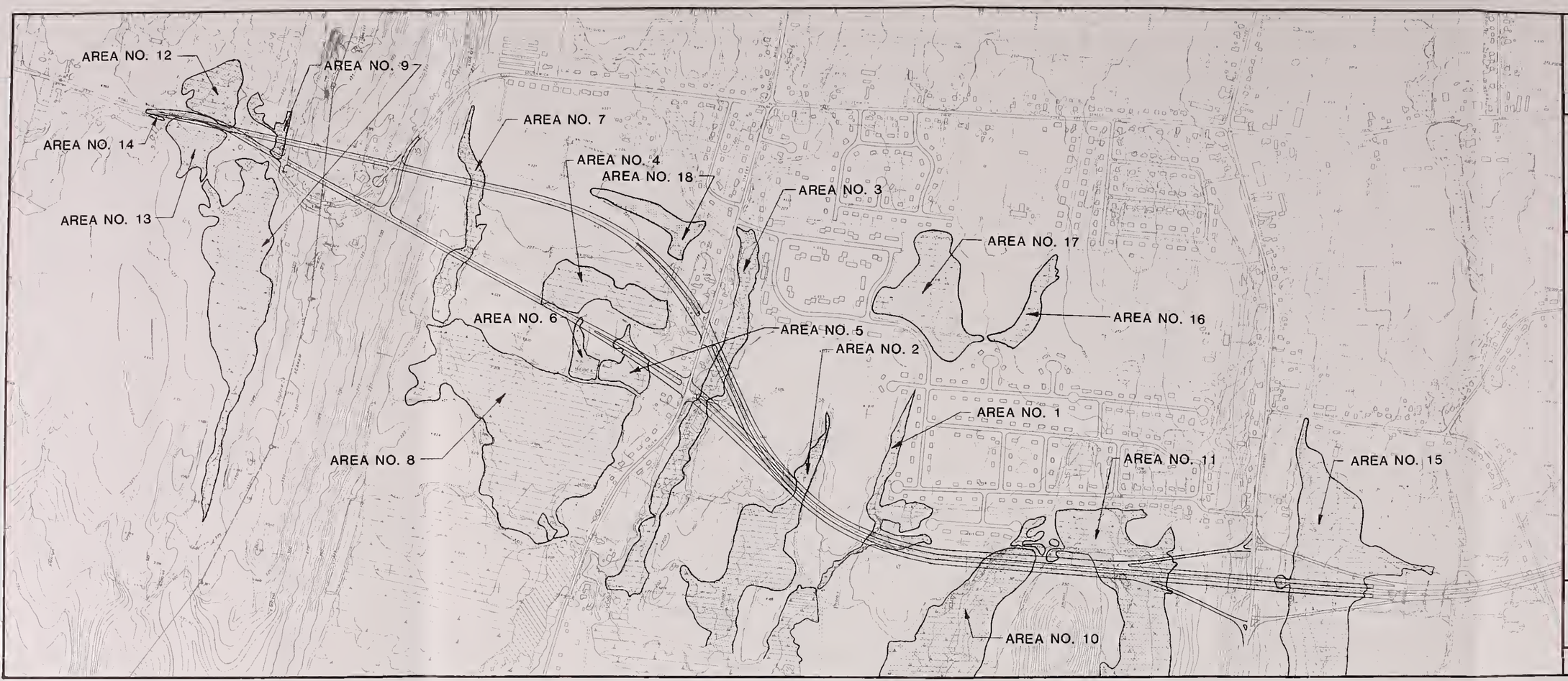
c. Alternative III & III(a)

Alternatives III and III(a) traverse Wetland Areas #1, 2, 3, 4, 5, 6, 7, 9, 10, 11, 12, 13 and 15. These wetland areas exhibit a moderate to high probability rating in performing the functions of groundwater discharge, floodflow alteration, and sediment stabilization. With the exception of Wetland Areas #1, 3 and 12, these areas have a high to moderate effectiveness and opportunity for sediment/toxicant retention and nutrient removal/transformation. The high rating is due to the presence of constricted outlets,slow velocity flows, non-point and point sediment sources, nutrient and toxicant inputs. Wetland Areas #4, 5, 6 and 7 are contiguous to the Leonard Pond wetland system. These areas are included in the US EPA 404(c) proposal and are noted as supporting a wide diversity of wildlife species during breeding, migration and wintering periods. Wetland Areas #12, #13 and #15 exhibit a low rating for wildlife breeding and aquatic diversity due to the lack of open water, permanent outlets and vegetation diversity.

d. Alternative IV & IV(a)

Alternatives IV and IV(a) traverse the upper reaches or headwaters of the 404(c) Wetland Area #7. This alignment, due to its northerly location does not include the 404(c) Wetland Areas #5 and #6. The portion of Wetland Area #4 within the right of way is north of the existing tree line and therefore outside of the 404(c) limits. In addition, this alignment crosses Areas #1, 3, 4, 9, 10, 11, 12, 13, 14 and 15. These areas function in a similar manner as discussed for Alternatives III and III(a). Alternatives IV and IV(a) include Wetland Area #14 which has a low rating of effectiveness and opportunity for nutrient removal/transformation. Conditions contributing to this rating include an unconstricted outlet, low plant diversity and a lack of nutrient sources.

THIS PAGE INTENTIONALLY LEFT BLANK



COMMONWEALTH OF MASSACHUSETTS
DEPARTMENT OF PUBLIC WORKS

ROUTE 57 RELOCATION

EXISTING WETLAND RESOURCES

N

0 600 1200

HOR. SCALE IN FEET

FIG. NO. IV-2

3. Massachusetts Wetland Protection Act

a. Definitions and Methodology

Wetlands within the project area are also regulated under MGL Chapter 131, Section 40, the Massachusetts Wetlands Protection Act (The Act). Areas subject to protection under the Act include any bank, freshwater or coastal wetland, beach, dune, flat, marsh, swamp, land under any water body, land subject to tidal action, coastal storm flowage and land subject to flooding (310 CMR 10.01).

Massachusetts Department of Environmental Protection (DEP) regulations require preconstruction review for activities within areas subject to the Act and for work within buffer zones. A Notice of Intent must be filed with the DEP and the local Conservation Commission, and work must comply with the resulting Order of Conditions.

The Act defines freshwater wetlands as "wet meadows, marshes, swamps and bogs, areas where groundwater, flowing or standing surface water or ice provides a significant part of the supporting substrate for a plant community for at least five months of the year; emergent and submergent plant communities in inland waters; and that portion of any bank which touches any inland waters."

The wetland delineation within the project area was also performed according to the Massachusetts DEP criteria. The delineation was conducted to determine the absence or presence of diagnostic environmental characteristics that are indicative of bordering vegetated wetlands. The methodology used in defining such wetland areas is discussed in detail in the Technical Appendix.

b. Eight Interests of the Act

The Act sets forth eight statutorily defined "interests" for which the resource areas subject to protection under the Act are presumed to be significant. The eight "interests" of the Act are as follows:

- Protection of Public & Private Water Supply
- Protection of Ground Water Supply
- Flood Control
- Storm Damage Prevention
- Prevention of Pollution
- Protection of Land Containing Shellfish
- Protection of Fisheries
- Protection of Wildlife Habitat

The resource areas within the project area serve one or more of these interests. An evaluation of each wetland's functions relative to the eight interests of the Act can be made by correlating the eight interests with the functions and values evaluated under the Federal Clean Water Act (FCWA).

Table IV-2 shows the relationship between the eight interests of the Act and the functions and values assessed under the Federal Clean Water Act (FCWA). Generally, this comparison identifies the significance of the wetland resource areas in protecting such interests.

c. Alternative III & III(a)

The alignment for these Alternatives traverses resource areas which serve the following interests of the Act: protection of wildlife habitat; protection of fisheries; prevention of pollution; and flood control. The wetland function of pollution prevention is especially important due to the proximity of several of these wetlands to agricultural uses, residential areas, septic systems and roadways which can potentially contribute to nutrient loadings. The larger Bordering Vegetated Wetlands within this area also function as floodwater storage areas.

d. Alternative IV & IV(a)

The functions served by the wetlands along Alternative IV and IV(a) are similar to the functions served by the wetlands along Alternative III and III(a). Alternative IV avoids or minimizes effects on wetland areas identified by US EPA and the Massachusetts Natural Heritage Program as having high wildlife value. This alternative is located in headwater areas of many of the tributaries and accordingly the wetlands are smaller in size. Conversely, these wetlands are not as beneficial in terms of the interests of flood control and storm damage prevention.

TABLE IV-2

OVERVIEW OF THE RELATIONSHIPS BETWEEN INTERESTS OF THE MASSACHUSETTS WETLAND PROTECTION ACT (MWPA) AND FCWA WETLAND FUNCTIONS AND VALUES

	WETLAND INTERESTS AS DEFINED BY THE MWPA						
FCWA WETLAND FUNCTIONS AND VALUES	Public & Private Water Supply	Ground-Water Supply	Storm Flood Control	Storm Damage Prevent.	Prevention of Pollution	Protection of Shell-fish and Fisheries	Wildlife
Groundwater Recharge	X	X			X		
Groundwater Discharge	X	X	X		X		
Floodflow Alteration			X	X	X		
Sediment Stabilization			X	X	X	X	
Sediment/Toxicant Retention	X			X	X	X	
Nutrient Removal/ Transformation	X				X	X	
Production Export						X	X
Wildlife Diversity/ Abundance							X
Aquatic Diversity/Abundance						X	
Uniqueness/Heritage							X
Recreation*							

* A wetland function not currently regulated under the Massachusetts Wetlands Protection Act

E. WILDLIFE

1. Wetland Habitat

Protection of wildlife habitat is one of the eight statutorily defined "Interests of the Act". Wildlife habitat is defined as those areas subject to the Act which due to their plant community composition and structure, hydrologic regime or other characteristics provide important food, shelter, migratory or overwintering areas, or breeding areas for wildlife.

The Act presumes that banks, land under water, and portions of land subject to flooding are significant to the protection of wildlife habitat and identifies relevant characteristics of these Inland Resource Areas. Based upon their topography, soil structure, and plant community, banks can serve functions of food, shelter and migratory and breeding areas for wildlife, and overwintering areas for mammals and reptiles. Based upon their plant community, soil composition and structure, hydrologic regime, topography, and water quality, land under water bodies or waterways and land subject to flooding can serve the functions of food, shelter and migratory and overwinter for wildlife and breeding areas for birds, mammals and reptiles.

The Act also protects Massachusetts State listed rare species. Rare species are defined as those vertebrates and invertebrate animal species officially listed as endangered, threatened, or of special concern by the Massachusetts Division of Fisheries and Wildlife (321 CMR 8.00). Projects which propose to alter a resource area which is part of said habitat, are not permitted to have any short or long term adverse effects on the habitat of the local population of rare species.

The Massachusetts Natural Heritage and Endangered Species Program (NHP) indicates that the vicinity of Leonard Pond and Wetland Area #9 are both areas of concern relative to wetland wildlife habitat.[1] NHP indicates that Spotted Turtles occur in Leonard Pond and that Four-toed Salamanders, Jefferson Salamanders and Eastern Box Turtles are in the vicinity of the brook which flows through Wetland Area #9. All four species appear on the List of State-Listed Rare Wildlife That Occur In Massachusetts Wetlands. These species have a Massachusetts status of special concern and are protected under the Act. On October 28, 1988, NHP conducted a preliminary site investigation for Alternative III and concluded that the proposed alignment was located north of the areas of concern. Alternative IV is located north of Alternative III, farther away from these habitats.

Fleshy fruits, seeds, and nuts provide food for several songbirds and mammals. Underground plant parts, such as roots, tubers, bulbs, and rootstocks from species such as cattails and violets provide food for muskrats, geese, duck and moles.

Wildlife sighted within the wetlands of the study area during field investigations include white tail deer, red fox, cottontail rabbit, painted turtle, mallard duck, Canada geese, scarlet tanager, bluejay, robin, common flicker, catbird, common crow and belted kingfisher. The wooded swamp areas provide food and cover for several wildlife species. Mammals expected to inhabit the area include shrews, mole, muskrat, beaver and racoon. Reptiles associated with forested wetlands in the area include spring peeper, wood, bull, leopard and green frog, eastern garter snake, eastern black racer, wood and eastern painted turtle, and red and spotted salamander. Common birds which find food and shelter in swamp areas include woodcock,

[1] Massachusetts Natural Heritage Program, letter, Sept. 22, 1988.

ruffed grouse, great blue heron, fly catchers, warblers, pileated and red-bellied woodpecker, pheasant, eastern phoebe, swallows, sparrows and blackbirds. Species which inhabit wetland areas with open water such as Area #3, Area #7 and Leonard Pond, include canada geese, black, mallard and wood ducks. Food sources present include burreeds, duckweeds, sedge, skunk cabbage, and water lillies.

In summary, the wetlands within the study area, particularly those within the Leonard Pond complex provide excellent food, cover and breeding areas for wildlife.

2. Upland Habitat

Upland habitat within the study area also supports a wide diversity of wildlife. These areas have a diverse vegetation structure and therefore add to the diversity of food and cover available to wildlife.

Provin Mountain, located between Wetland Area #8 and #9, has two distinct areas. A large part of this mountain is populated by mature trees with white pines, hemlocks, beeches, birches, oaks, maples, aspens and poplars occurring frequently. One area of the mountain was logged and is currently in a period of regrowth consisting of a different species composition. These include multi-flora rose, sumac, blackberry, annual and perennial weeds, as well as several small birches, white pines, and those trees which are able to regenerate from the stump or sucker roots typically certain species of oak and poplar.

The localized areas of higher elevation which occur intermittently in the project area are typically populated by white pines, several species of oaks and members of the poplar family, all of which prefer well drained soils.

The field edges in the agricultural areas are densely populated by herbaceous plants and woody shrubs. These species take advantage of the sunlight generally not available in the understory, and are affected less by exposure to the environmental changes and occasional cut backs. Sumac, multi-flora rose, asters, yarrow, Queen Anne's lace, evening primrose, golden-rods, and many other species of weeds occur frequently in these areas.

Available food and cover dictate the presence and abundance of wildlife. The upland areas in the region of the proposed project have good community diversity and therefore provide food and cover for many species of wildlife. White tailed deer, and cottontail rabbits both browse on twigs and bark. Red maple and sumac are favorites by both. Porcupines, which may be present in this region, eat the inner bark of many trees including, hemlock, maple, beech, and birch during the winter and a wide variety of herbaceous material throughout the growing season.

Many species of songbirds are indigenous to this area or are transients during migration or breeding season. Woodpeckers, chickadees, crows, bluejays, swallows, nuthatches, thrashers, robins, waxwings, starlings, warblers and many other species find food in the area throughout the year. These birds have a diverse diet including seeds, fruits, insects and insect larvae and eggs.

Seeds, fruit, roots, flower parts, and insects are also a source of food for many small mammals such as moles, field mice, shrews, chipmunks, and squirrels. The presence of these small mammals provide food for fox and birds of prey such as owls and hawks.

In addition to songbirds and birds of prey, these upland areas are well suited for gamebirds. Species of gamebirds likely to occur include ruffed grouse, bobwhite quail, pheasant, wild turkey, woodcock, and morning dove. A large percentage of these bird's diets consist of seeds, fruits, flower parts, and insect material. The upland area also provide them with excellent cover and breeding areas.

The upland environments also provide suitable habitat for many species of wildlife which are interdependent of the wetland systems. Upland environments of greatest significance for wildlife are those which provide habitat diversity and those areas contiguous to wetland areas. The agricultural areas within the project area are the least high quality uplands for wildlife functions due to lack of suitable habitat and the maintained nature of the agricultural fields.

F. LAND USE AND SOCIOECONOMIC

Construction of a limited access highway relocation project can impact land use both within the project area and on an intercommunity scale. Primary impacts occur within the project area when existing land uses are converted due to acquisition of land for highway purposes.

Secondary impacts can occur both within the project area and on an intercommunity basis when land use changes are stimulated by changes in traffic volumes on existing streets or by changes in travel time and associated changes in accessibility. Community wide land use and population conditions and trends are evaluated in Section M.

Predominant land uses along Alternatives III and III(a) and Alternatives IV and IV(a) include residential, agricultural, and undeveloped. Much of the undeveloped land is included in large parcels which also include agricultural use.

The Towns of Agawam and Southwick are influenced by long standing suburbanization and development trends. These community wide trends are reflected in ongoing development in the project area. During the 1980's residential lots continued to be developed, including but not limited to expansion of the Hendom Heights subdivision and the Pheasant Hill Village multifamily development. Existing land uses along South Westfield Street and along South West Street are predominantly residential. The land along South Westfield Street is zoned industrial to commercial and it is anticipated this street will eventually be redeveloped for non-residential uses. The land on South West Street and along the remainder of the project corridor is zoned residential. It is anticipated that this land will eventually be developed for residences in accordance with municipal zoning and subdivision requirements. Land within wetlands will remain undeveloped due to protection accorded by Federal and Massachusetts regulations. Steeply sloped areas, particularly near Provin Mountain, will remain undeveloped or be developed for low density rural residential use.

The July 1984 Master Plan Update for Agawam included recommendations for selective rezoning, which would increase minimum lot sizes to 1.5 acres in agricultural areas to preserve their rural qualities.[1]

[1] (Report No. 1, Data Report on Population, Land Use, Housing, Industrial and Commercial Development in Agawam, Supplemental to the 1976 Town of Agawam Master Plan, 1984)

G. RELOCATION

To provide an overview of the feasibility of residential relocation, a preliminary analysis of housing availability was undertaken in 1988 and 1989.

The survey utilized the classified section of the Springfield Sunday Republican from August, 1988 thru January, 1989. Table IV-3 shows properties available for sale during this period.

TABLE IV-3
HOUSING MARKET ANALYSIS

Price Range	2-Bedrooms	3-Bedrooms	4-Bedrooms
Agawam			
Under $115,000	24	9	3
$115,100 - 130,000	29	89	7
130,100 - 140,000	6	81	27
140,100 - 149,000	3	77	36
Southwick			
Under $115,000	13	3	--
$115,100 - 130,000	6	13	--
130,100 - 140,000	1	0	--
140,100 - 149,000	1	12	--

The survey indicates that adequate moderately priced housing is available for various household sizes within these communities.

H. FARMLANDS

The Town of Agawam enjoyed a rich and healthy agricultural economy during the 18th and 19th centuries. During the 20th century, however, there has been a steady decline in agricultural activity. A 1983 Agricultural Study of Agawam states that farmlands have declined from about 7,500 acres in 1950 to 2,500 acres in 1982, a loss of approximately 70% of the Town's farmlands. A field inventory in Agawam, conducted in 1984 and 1985, identified only 2,100 acres of cropland remaining.[1]

Public concerns over farmland have resulted in protective legislation at both the State and Federal levels. In the late 1970's and early 1980's the Commonwealth of Massachusetts passed legislation which offered its farming communities a variety of incentives to hold onto their farmlands, open areas, and recreation lands instead of giving into the pressure for residential and commercial development. This legislation is in the form of tax incentives under the Farmland Assessment Act (MGL Ch. 61, 61a, and 61b) and development restrictions under the Agricultural Preservation Restriction (APR) Program.

[1] Allen V. Barker and Jo-Ann C. Dery, Assessment of Agricultural Activities on Cropland in Massachusetts, Environmental Institute, University of Massachusetts and the Office of Research and Standards, Massachusetts DEP.

The Farmland Assessment Act contains the following provisions: 1) Chapter 61 provides tax reductions for Forest Lands, 2) Chapter 61a provides tax reductions for Farmlands, and 3) Chapter 61b provides tax reductions for Recreation and Open Lands. The APR Program provides incentives for farmers to incorporate development restrictions into deeds for their property. In return for these restrictions, the farmers are compensated for the difference between the development value and the agricultural value of their property.

In 1981, the Federal Government enacted Public Law 97-98 which required the U.S. Department of Agriculture to develop criteria for identifying the effects of Federal programs on the conversion of farmland to nonagricultural uses. The Farmland Protection Policy Act (FPPA), which became effective on August 6, 1984, details the procedures to be followed in identifying and rating the impact of farmland conversion.

Farmlands in the vicinity Alternatives III, III(a), IV and IV(a) have been analyzed in accordance with regulations implementing the Farmlands Policy Protection Act, Public Law 97-98 (FPPA). There are three farms in the project area that are potentially affected, both directly and indirectly, by the construction of either Build Alternative. Conversion impact ratings are developed using the U.S. Department of Agriculture, Soil Conservation Service's "Farmland Conversion Impact Rating Form AD-1006".

Procedures established under the FPPA require submittal of data to the Soil Conservation Service, which then makes a determination of the categories and values of farmland. The Soil Conservation Service classified farmlands in the project area in July of 1990 and their classifications are used in completion of Form AD-1006.

The Farmland Protection Policy Act (FPPA) defines three types of farmland, i.e. prime, unique, and statewide or locally important. "Prime Farmland" is defined as land that has the best combination of physical and chemical characteristics for producing food, feed, fiber, forage, oilseed and other agricultural crops with minimum impacts of fuel, fertilizer, pesticides, and labor, and without intolerable soil erosion. Prime farmland includes land that possesses the above characteristics but is being used currently to produce livestock and timber. It does not include land already in or committed to urban development or water storage.

"Unique Farmland" is land other than prime farmland that is used for production of specific high-value food and fiber crops. It has the special combination of soil quality, location, growing season, and moisture supply needed to economically produce sustained high quality or high yields of specific crops when treated or managed according to acceptable farming methods. Examples of such crops include tree nuts, olives, cranberries, fruit, and vegetables.

"Farmland Other than Prime or Unique Farmland" that is of statewide or local importance for the production of food, feed, fiber, forage, or oilseed crops, as determined by the appropriate State or unit of local government agency or agencies.

Most of the farmlands in the project area are classified as prime farmland while the remainder are classified as farmlands of state or local importance. There are no unique farmlands in the project area.

Farmlands along Alternatives III, III(a), IV and IV(a) are indicated in Figure V-9 and are described in the following paragraphs.

Arthur P. and Dale Boglisch & Sons, Inc., Tree Nursery is located on South West Street. This 88 acre parcel of land contains a 54 acre nursery that grows deciduous and conifer trees for wholesale distribution. The remainder of the property is either occupied by wetlands or the steep slopes of Provin Mountain.

The Boglisch property is classified as prime farmland. It is presently protected under Chapters 61 and 61a of the Farmland Assessment Act.

Tuckahoe Turf Farm is located on South West Street opposite the Boglisch property and was formerly a tobacco farm. This 258 acre parcel of land has approximately 80 acres devoted to the production of turf for residential and commercial landscaping. Much of the remainder of this property is occupied by wetlands and other areas not suitable for farming.

The majority of the Tuckahoe Turf Farm is classified as prime farmland and the remainder is classified as farmland of statewide and local importance. It is presently protected under Chapter 61a of the Farmland Assessment Act.

Schmaelzle Property is located on South Westfield Street. This 50 acre parcel of land is used primarily for the raising of Hereford cattle, with a small field used for the production of corn. This property is not under any provision of the Farmland Assessment Act.

William O. Spear Pepper Farm is located at 292 South West Street. This 133 acre land parcel is used to grow produce and table vegetables. A portion of the Leonard Pond wetland is located on this property. The Spear Farm is classified as prime farmland and protected under Chapter 61a of the Farmland Assessment Act.

I. SPECIAL OR HAZARDOUS WASTES

An Initial Site Assessment (ISA) was conducted to provide an overview of known or potential waste sites within or near the proposed right-of-way for the Alternative III and IV alignments. The investigations involved a field reconnaissance of the project area, a review of available public records and past/present land uses, and interviews with agency and Town officials.

The investigation consisted of document reviews and/or interviews with the following parties:

U.S. Environmental Protection Agency - Region I (EPA)

Lexington, Massachusetts, Surveillance and Analysis Office, and Emergency Response Office.

Commonwealth of Massachusetts; Department of Environmental Protection (DEP)

Springfield Office, Hazardous Site Assessment Section and the Division of Water Pollution Control.

Town of Agawam, Massachusetts

Fire Department
Police Department
Health Department
Public Works Department

Town of Southwick, Massachusetts

Fire Department
Health Department
Town Clerk

The ISA revealed the following information:

- The Agawam Fire Prevention Officer has only recent inventory registration records or permit application records for retail sale of petroleum products. Skid mounted tanks and underground storage tanks on farmlands have not been required to be inventoried by the Fire Department. No release of gasoline or fuel oils to the environment in the project area is on public record with the Fire Department.

- In 1984, the DEP conducted a study in the Town of Agawam to investigate the potential for groundwater contamination by ethylene dibromide (EDB) from agricultural pesticide sources. Tap water samples taken from several private wells, south of the project area, did not find detectable levels of EDB contamination of the ground water.

- There are two incidents of record involving leaking underground fuel storage tanks along existing Route 57 (Southwick Street) near the South Westfield Street intersection. These service stations are located over 4000 feet north of the proposed project. The remediation phase for both incidents have been initiated and are being monitored by the EPA and the DEP. The EPA has stated that both incidents would not have any long term environmental impact on the area.

- There was a former gasoline service station near the intersection of existing Route 57 (Southwick Street) and South West Street, about 2000 feet north of Alternative IV. The facility is now operated as a convenience store. There are no records that the gasoline tanks have been removed according to the Agawam Fire Department.

- The Agawam Fire Prevention Headquarters has record of an underground fuel oil tank at #336 South Westfield Street. In addition, an underground tank was suspected at the former Harbey Industries property at #364 South Westfield Street. These two properties were acquired by the Commonwealth of Massachusetts, Department of Public Works in 1985 as part of the initial right-of-way takings for Phase One of the Route 57 Relocation Project. The structures on the properties have been demolished, but there is no permit on file for removal of any tanks.

  A Preliminary Site Investigation (PSI) was performed on these two land parcels during the summer of 1990. The PSI consisted of a magnetometer survey and a subsurface exploration program utilizing test pits to investigate for the possible presence of underground tanks and soil contamination within the properties.

  No underground tanks were located during the magnetometer survey or by the test pit explorations. Four (4) soil samples recovered from the test pit excavations were laboratory analyzed for Total Petroleum Hydrocarbons (TPH). Three (3) samples indicated that no hydrocarbons were present, and one (1) sample (taken at a joint in an underground pipe leading to a catch basin in the street) indicated the presence of diesel fuel at 640 ppm (parts per million). The State action level is 50 ppm for petroleum hydrocarbons.

J. AIR QUALITY

1. Introduction

To evaluate air quality, an indirect source evaluation was conducted which involved: (1) a mesoscale air quality study for carbon monoxide (CO), Nonmethane Hydrocarbons (NMHC) and Nitrogen Oxides (NOx); and (2) a microscale air quality study for CO at 7 intersections. The study examined the following eleven cases:

1) 1988 Existing Conditions
2) 1993 Alternative I (No-Build)
3) 1993 Alternative III
4) 1993 Alternative III(a)
5) 1993 Alternative IV
6) 1993 Alternative IV(a)
7) 2013 Alternative I (No Build)
8) 2013 Alternative III
9) 2013 Alternative III(a)
10) 2013 Alternative IV
11) 2013 Alternative IV(a)

The expected time of completion for Alternative III, III(a) IV and IV(a) is 1993. The design year for the project is 2013, twenty years following construction completion. The analysis for Alternatives III and IV examined the South West Street and new Relocated Route 57 intersection under at-grade and signalized conditions in 1993 and 2013. The analysis for Alternatives III(a) and IV(a) provides a grade separation allowing South West Street to pass over Relocated Route 57.

2. Traffic Data

The traffic data for the mesoscale analysis included Average Daily Traffic (ADT) volumes and speeds for roadway links inside the mesoscale area for all eleven cases listed above. A summary of mesoscale traffic data can be found in the Technical Appendix.

Traffic data for the microscale study included peak 1-hour and 8-hour volumes at all modeled interchanges and intersections as well as turning movements, signal phasing and signal timing. In several cases both signalized and unsignalized traffic data were presented for an intersection depending on the Level of Service. For purposes of the air quality analysis, the lower of the two Levels of Service was used to ensure conservative results. The methods of traffic control utilized in each case are outlined in Table IV-4.

Alternatives III and IV and Alternatives III(a) and IV(a) have separate sets of mesoscale and microscale traffic data due to the at-grade and grade separation options explored for South West Street and Relocated Route 57.

3. Methodology

Route 57 is classified as an indirect source. That is, the only source of air pollution associated with the highway is from motor vehicles that use it. Of the pollutants regulated by U.S. EPA, the principal ones emitted by motor vehicles or formed from their emissions are carbon monoxide (CO), nitrogen oxides (NOx), and ozone (03). The pollutants examined in the mesoscale analysis are CO, NOx, and nonmethane hydrocarbons (NMHC). NMHC emissions interact with other organic compounds in a complex series of photochemical reactions to produce ozone in ambient air. Carbon monoxide is the pollutant examined in the microscale analysis; its effects are greatest in the local areas close to the roadways.

The adverse health effects of CO are a result of its combination with blood hemoglobin to form carboxy-hemoglobin (COHb). This compound interferes with the life-sustaining transfer of oxygen from the lungs to the body tissues, and the return of carbon dioxide from the tissues to the lungs. The presence of relatively small amounts of CO interferes with essential cardiovascular-respiratory functions. Nitrogen dioxide (NO2) as an air pollutant aggravates respiratory disorders such as asthma and bronchitis and can increase susceptibility to respiratory infections. Ozone (03) irritates the eyes and respiratory tract, makes breathing difficult especially during exercise and can aggravate respiratory disorders.

TABLE IV-4

ASSUMED METHOD OF TRAFFIC CONTROL USED IN AIR QUALITY ANALYSIS (1- AND 8-HOURS)

Intersection	1988 Existing Conditions	1993 Alt. I (No Build)	1993 Build Alt. III & IV	2013 Alt. I (No Build)	2013 Build Alt. III & IV
Existing Route 57/Route 187	Actuated Signal	Actuated Signal	Actuated Signal	Actuated Signal	Actuated Signal
Existing Route 57/N. West St. S. West St.	Actuated Signal	Actuated Signal	Actuated Signal	Actuated Signal	Actuated Signal
Route 187/Shoemaker Lane	Stop Sign	Stop Sign	Stop Sign	Actuated Signal	Actuated Signal
Existing Route 57/New Route 57	NA	NA	Stop Sign	NA	Stop Sign
New Route 57 EB Ramps/Route 187	NA	NA	Stop & Yield Signs	NA	Stop & Yield Signs
New Route 57 WB Ramps/Route 187	NA	Stop & Yield Signs	Stop & Yield Signs	Stop & Yield Signs	Stop & Yield Signs
New Route 57/S. West St.	NA	NA	Actuated Signal*	NA	Actuated Signal*

* Under the grade-separated scenario for Alternatives III(a) and IV(a), there is not an intersection present. Hence, both streets move in a free-flow mode.

4. Air Quality Standards

National Ambient Air Quality Standards for CO, NO2, and 03 have been set by the U.S. EPA. Standards for the Commonwealth of Massachusetts are identical to the federal standards. The numerical values are shown in Table IV-5. For CO, the standards, intended to protect the public health, set a maximum concentration of 35 parts per million (ppm) for a 1-hour period and 9 ppm for an 8-hour period, each not to be exceeded more than once per year. The NO2 standard has been attained statewide, while areas of non-attainment remain in the State for CO and ozone. The entire State of Massachusetts is classified by DEP as non-attainment for only one of these pollutants--ozone. The Towns of Southwick and Agawam are considered as in attainment for CO. The target date in the Massachusetts State Implementation Plan (SIP) for attainment of the CO and ozone standards in Massachusetts was December 31, 1987 and has been extended by the Clean Air Act Amendments to November 15, 1999. The Commonwealth of Massachusetts has adopted a SIP which includes transportation control measures, and which was approved by US EPA on November 9, 1983. Due to continuing non-attainment problems in urban areas, the Commonwealth is in the process of revising that SIP and regulatory changes are required on an annual basis from November 15, 1991 until attainment of the 03 standard is achieved.

The FHWA has determined that both the transportation plans and the Transportation Improvement Programs (TIP) for Route 57 conform to the 1982 SIP. This project is included in the TIP for the Pioneer Valley Planning Commission. Therefore, pursuant to 23 CFR 770, this project conforms to the current SIP. The technical approach to the air quality analysis was coordinated with US EPA and the Massachusetts Department of Environmental Protection (DEP).

TABLE IV-5

NATIONAL AND STATE AMBIENT AIR QUALITY STANDARDS

Pollutant	Averaging Time	Standard (ug/m3)	Standard (ppm)
Carbon Monoxide (CO)	8 hour	10,000	9
	1 hour	40,000	35
Ozone (03)	1 hour	240	0.12
Nitrogen Dioxide (NO2)	Annual	100	0.05

ug/m3 = micrograms per cubic meter
ppm = parts per million

5. Mesoscale Analysis

The mesoscale air quality study area is generally triangular in shape and defined by Route 187 (South Westfield Street) from the new interchange at Relocated Route 57 north to existing Route 57; existing Route 57 west to the westerly end of the Proposed Project at the Agawam/Southwick Town Line; and east along Relocated Route 57 (Alternatives III, III(a), IV and IV(a)) back to Route 187. Motor vehicle emissions on these roadways were calculated within this area which includes the segment of South West Street between existing and Relocated Route 57.

The mesoscale analysis calculates total nonmethane hydrocarbon (NMHC), carbon monoxide (CO), and oxides of nitrogen (NOx) emissions in the mesoscale study area. These calculations require both traffic data and motor vehicle emission rates (see Technical Appendix). All emissions rates were obtained from the U.S. EPA MOBILE4.1 emissions model and assumed a vehicle population containing light and heavy duty gasoline trucks, light and heavy duty diesel trucks, and motorcycles.[1] The NMHC emissions represent VOC emissions as predicted by MOBILE4.1. The input parameters used for MOBILE4.1 are summarized in the Technical Appendix. The methodology for the mesoscale analysis was discussed with and approved in advance by the Massachusetts DEP.[2] (see Technical Appendix)

Emission rates in grams per mile (g/mi) were taken directly from the MOBILE4.1 output. The total daily air pollutant emissions for each roadway line was calculated by multiplying together the link length (in miles), the two-way Average Daily Traffic (ADT) volume (in vehicles/day), and the emission rate (in g/mi-vehicle). Values for these parameters are given in the Technical Appendix. The total emissions for these pollutants for each alternative and for each year are given in Section V of this Report.

[1] U.S. EPA, User's Guide to MOBILE4.1: Mobile Source Emissions Model, EPA-AA-TEB-91-01, Ann Arbor, MI, July, 1991, including software from EPA dated November 4, 1991.

[2] Personal Communication, Mr. Michael Scherer, Mass. DEP, Division of Air Quality Control, Boston, September 30, 1988.

6. Microscale Analysis

The microscale study area consists of seven intersections in the traffic study area where the highest levels of CO are expected. These locations are illustrated in the Technical Appendix and include:

- Existing Route 57/Route 187 (South Westfield Street)
- Existing Route 57/N. West Street/S. West Street
- Shoemaker Lane/South Westfield Street (Route 187)
- Relocated Route 57 EB Ramps/Route 187 (S. Westfield St.)
- Relocated Route 57 WB Ramps/Route 187 (S. Westfield St.)
- Relocated Route 57/South West Street
- Relocated Route 57/Existing Route 57

More than one figure is provided for some intersections to illustrate changing roadway geometry and/or traffic control methodology. A total of 39 sensitive receptors were selected to represent areas where maximum CO levels are expected and where the public has access. US EPA has approved these receptor locations. The receptor locations are shown in Figure V-10 and are listed in Table IV-6.

No microscale air quality analysis was conducted for the intersection of Relocated Route 57 at South West Street for the grade-separated case (Alternatives III(a) and IV(a)) since no "intersection" exists. If the CO levels are safely in compliance under the at-grade condition, then it can be concluded that CO levels will be further reduced when traffic is moving in a free-flow mode for the grade-separated condition.

The microscale analysis calculated maximum 1-hour and 8-hour carbon monoxide (CO) concentrations at the 39 sensitive receptor locations, employing computer models. The first model (U.S. EPA MOBILE4.1) was used to calculate the emissions of CO at an intersection based on traffic flow. The second model (CAL3QHC) was used to predict concentrations of CO in the air at the sensitive receptor site. Input parameters used for both models are summarized in the Technical Appendix. The methodology for the microscale analysis was discussed with and approved in advance by the Massachusetts DEP Division of Air Quality Control[1].

[1] Communication with Michael Scherer, op.cit.

TABLE IV-6

MICROSCALE ANALYSIS
AIR QUALITY RECEPTOR LIST

Receptor Location	No.	Description
Existing Rte. 57/Rte. 187	1.	Front lawn of C.M. Granger Schoolyard
	2.	Commercial-Realtors Office
	3.	Commercial-ATM Building
	4.	Commercial-Furniture Store
	5.	Commercial-Gas Station Office
Exist. Rte. 57/N. West St./ S. West St.	6.	Residence-323 Southwick St.
	7.	Residence-6 S. West St.
	8.	Residence-3 N. West St.
	9.	Residence-312 Southwick St.
Rte. 187/Shoemaker Lane	10.	Empty Lot SE-vegetated
	11.	Residence-216 S. Westfield St.
	12.	Empty Lot NW-barren
	13.	Residence-S. Westfield St.
	14.	Suburban Garage
Reloc. Rte. 57 EB Ramps/ Route 187	15.	Luigi's Auto Body Shop
	16.	Residence-394 S. Westfield St.
Reloc. Rte. 57 WB Ramps/ Route 187	17.	Empty field NE-overgrown
	18.	Residence-3 Hendom Drive
Reloc. Rte. 57/S. West St.	19.	Empty field NE-overgrown
	20.	Empty field SE-vegetated
	21.	Empty field SW-vegetated
	22.	Residence-292 S. West St.
	23.	Empty field SE-wooded
	24.	Residence-244 S. West St.
	25.	Residence-S. West St.
	26.	Residence-187 S. West St.
	27.	Route 57 - Right-of-Way NE
	28.	Route 57 - Right-of-Way SE
	29.	Route 57 - Right-of-Way SW
	30.	Route 57 - Right-of-Way NW
Existing Route 57/ Relocated Route 57	31.	Residence-662 Southwick St.
	32.	Residence-316 Feeding Hills Rd.
	33.	Uninhabited Wooded Area
	34.	Uninhabited Wooded Area
	35.	Uninhabited Wooded Area
	36.	Uninhabited Wooded Area East
	37.	Uninhabited Wooded Area South
	38.	Uninhabited Wooded Area West
	39.	Residence - Southwick St.

The modeling approach is very conservative as it assumes the simultaneous occurrence of:

- Peak traffic volumes
- Worst case emission rates
- Worst case dispersion conditions
- The worst case wind direction for cumulative impacts
- Complete persistence of the worst case wind speed, wind direction, and atmospheric stability over an 8-hour period (i.e., no credit was taken for changes in meteorological conditions).
- Conservative CO background levels.

For free-flow roadway links, the emission rates (in g/mi and g/min) can be read directly from the MOBILE4.1 output shown in the Technical Appendix.

7. Mesoscale Analysis and Impacts

The Massachusetts SIP has established the following Transportation Project Review Consistency Criterion:

> *Hydrocarbon emissions from the preferred alternative should be less than those from the no build case in both the short and long term; in cases where hydrocarbon emissions from the preferred alternative are greater, than all reasonable and feasible hydrocarbon reduction/mitigation measures shall be included.*

The criterion is applied to the mesoscale results for each build case below.

Under 1988 existing conditions, total mesoscale emissions for CO, NMHC, and NOx are 511.3 kilograms per day (kg/day), 119.7 kg/day and 87.0 kg/day respectively.

Total mesoscale emissions in the future without the Proposed Project can be compared to existing conditions as seen in Table V-8. Emissions of all three pollutants were predicted to decrease from 1988 to 1993. These decreases will occur due to continuing federal and state emission reduction initiatives. The Federal Motor Vehicle Control Program requires strict pollution controls on new cars. Older vehicles in the population are still being replaced by cars with better emission controls. In addition, the State's Inspection & Maintenance Program subjects a larger fraction of the vehicle population to stringent test limits each year.

8. Microscale Analysis and Impacts

Microscale modeling results are shown in Table V-13 and Table V-14 for all cases. The modeling results for the 1988 Existing Conditions show that all 39 receptors have maximum CO levels below the 1-hour NAAQS limit of 35.0 ppm, and 38 of 39 receptors have maximum CO levels below the 8-hour NAAQS of 9.0 ppm. Maximum 1-hour CO values range from 3.0 to 18.1 ppm while 8-hour concentrations range from 2.0 to 9.8 ppm. The concentration of 9.8 ppm was predicted at receptor #4 "Furniture Store" at the intersection of Existing Route 57 and Route 187. Due to the conservative assumptions employed in the modeling analysis, this result indicates that CO levels, under worst case conditions, may have violated the NAAQS at this one location in 1988. For all future cases, CO levels are in compliance at this location due to reduced future motor vehicle emissions.

Only three of the seven intersections modeled have any form of traffic control (Existing Route 57/Route 187, Existing Route 57/N. West Street/ S. West Street, and Route 187/Shoemaker Lane). However, the other four intersections were modeled using the free-flow traffic volumes in order to provide baseline comparisons for the future cases. The CO levels at the receptors around these four future intersections were composed primarily of the background level.

In the 1993 Alternative I case, the modeling results show no violations of the 1-hour NAAQS of 35.0 ppm or of the 8-hour NAAQS of 9.0 ppm for carbon monoxide. Of all receptors in the study, there is a project-wide decrease in predicted maximum CO levels of over 20% from the 1988 1-hour Existing case. There is also a project-wide decrease of about 15% from the 1988 8-hour Existing case. These predicted decreases in the 1993 Alternative I case are due to a greater percentage of cars on the road with stringent emission controls in future years.

The modeling results for the 1993 Alternative I case show that all receptors are in compliance with the 1-hour and 8-hour NAAQS. Maximum 1-hour CO values range from 3.0 to 11.6 ppm while 8-hour concentrations range from 2.0 to 6.8 ppm.

In the 2013 Alternative I case, the modeling results show no violations for the 1-hour NAAQS of 35.0 ppm or of the 8-hour NAAQS of 9.0 ppm for CO. There is a project-wide decrease in predicted maximum CO levels of approximately 15% from the 1993 1-hour Alternative I case while a decrease of approximately 10% is seen for the 8-hour Alternative I case. These predicted decreases in the 2013 Alternative I case are also due to a greater percentage of cars on the road with stringent emission controls in future years.

Modeling results for the 2013 Alternative I case show that all receptors are in compliance with the 1-hour and 8-hour NAAQS. Maximum 1-hour CO values range from 3.0 to 7.1 ppm while 8-hour concentrations range from 2.0 to 4.4 ppm.

K. NOISE

1. Introduction

The limits of the study area and the Alternatives under study are shown in Figure V-5. In the case of the no-build Alternative I, traffic traveling west along Relocated Route 57 would turn right onto South Westfield Street and head north to its intersection with Southwick Street (Existing Route 57) in Feeding Hills. At this intersection, traffic would then turn left and travel west down Southwick Street which becomes Feeding Hills Road in Southwick.

Both an at-grade intersection and a grade separation have been evaluated at Relocated Route 57/South West Street under the build alternatives. Under the grade separated options (Alternatives III(a) and IV(a)) South West Street would bridge over Route 57.

The purpose of this study is to assess the impact of sound produced by traffic traveling along the alternative alignments with respect to Federal Highway Administration (FHWA) Procedures for Analysis and Abatement of Highway Traffic Noise and with respect to Massachusetts Highway Department Criteria. The assessment procedure involves the following items:

- Identification of existing activities;
- Determination of existing sound levels;
- Prediction of future traffic sound levels;
- Determination of traffic noise impacts; and
- Recommendation of traffic noise abatement as needed.

The following discussions describe acoustical descriptors, traffic noise criteria, and present the five above-indicated noise assessment items.

2. Characterizing Sound Level

Generally, the sensitivity of human hearing is restricted to the frequency range 20 Hz to 20,000 Hz. The human ear, however, is most sensitive to sound in the 500 to 8,000 Hz frequency range. Above and below this range, the ear becomes progressively less sensitive. To account for this feature of human hearing, sound level meters incorporate a filtering of acoustic signals according to frequency. This filtering is devised to correspond to the varying sensitivity of the human ear to sound over the audible frequency range. This filtering is called A-weighting. Sound pressure level values obtained using this weighting are referred to as A-weighted sound pressure levels and are signified by the identifier dBA or A-weighted decibels. To provide some perspective, Figure IV-3 gives typical A-weighted sound pressure levels (dBA) of various common sounds.

An important feature of the human perception of continuous sound is that an increase or decrease in sound pressure level by 3 dB or less is barely perceptible; an increase or decrease of 5 dB is clearly perceptible; an increase or decrease of 10 dB is perceived as a doubling or halving of noise level.

Besides frequency and level, the characteristics of sound varies over time. During the day, noise levels near a highway are generally high, and increase when trucks pass and decrease between vehicle platoons. At night, when traffic volumes are lower, the same variation occurs but is centered around a lower level.

Noise descriptors are quantifications of noise that combine, into a single value, the three chief features of sound: level, frequency and temporal characteristics. The use of an A-weighted sound pressure level combines the first two characteristics - level and frequency - into a single number. By averaging A-weighted sound pressure levels over time, sound level descriptors combining all three features are developed.

A commonly used descriptor is Percentile Exceeded A-weighted Sound Levels, A-weighted sound pressure levels exceeded for specific percentages of time within a noise monitoring period. For example, the one-hour 50th percentile A-weighted sound level, symbolized as the L50 (1 hour), is the A-weighted sound level exceeded a total of 30 minutes out of a continuous 60-minute period.

For several years, the U.S. EPA has encouraged the use of the equivalent sound level: a descriptor that uses the average A-weighted sound energy and differs significantly from 50th percentile, or average, sound pressure level. Unlike the 50th percentile sound level. the equivalent sound level is influenced by peak noise levels of short duration. Therefore, the A-weighted equivalent sound level combines level, frequency and temporal character into a single-valued descriptor. Equivalent sound level, symbolized by Leq, is always higher than the L50, as it is influenced by noise contributions of high level and short duration such as aircraft flyovers or noisy truck passbys.

In accordance with current FHWA practice the hourly equivalent sound level, Leq (1 hour), is used for the acoustical analyses in this Report.

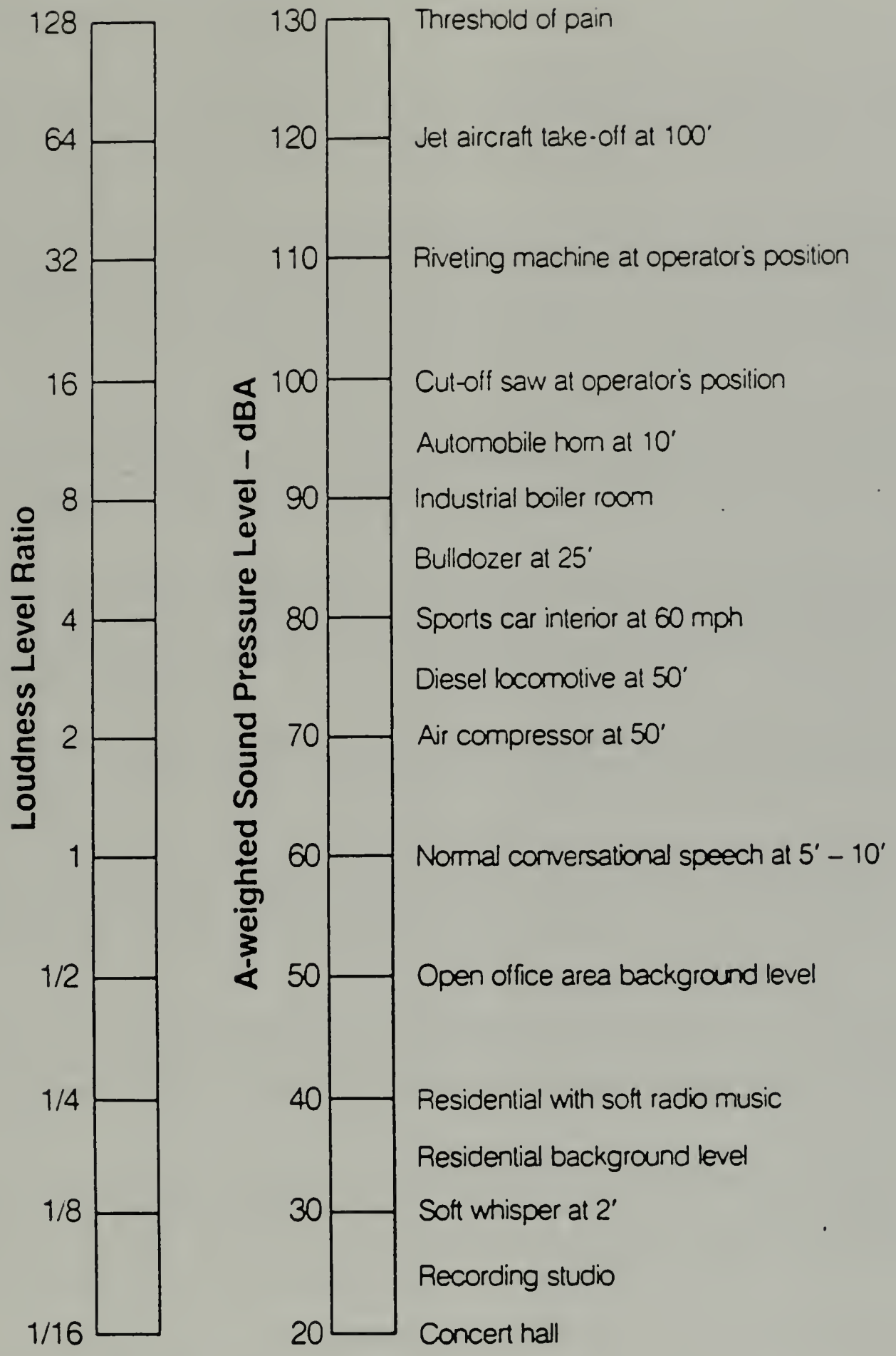


Figure IV-3

Loudness ratio and decibel scale (dBA) for common sounds

3. Existing Sound Levels

The land uses potentially affected by the Route 57 alternatives are largely residential, agricultural, and wetlands. For purposes of this study, twelve residential locations have been selected within the study area for analysis (Refer to Figure V-11). A brief description of these locations and the rationale for their selection for study is as follows:

Location 1 - 7 Hendom Drive is a residence, approximately 300 ft. from South Westfield Street, and located at the entry of a subdivision. Sound levels at Location 1 are dominated by traffic on South Westfield Street. This location was selected because of its close proximity to Alternatives III and IV and to the entrance ramp servicing westbound traffic from South Westfield Street.

Location 2 - 143 Hendom Drive is quite remote from major roads. Indigenous sounds and sounds produced by automobiles and activities in the neighborhood are the dominate sources of sound at this location. It was also selected to assess the expected substantial increase in sound level at this location under Alternatives III and IV.

Location 3 - 271 South West Street is a residence situated south of Alternative III. Sound levels at this location are dominated by traffic noise along South West Street. This location was selected principally because of its distance from Alternative III and to assess changes in the noise from traffic on South West Street.

Location 4 - 675 Southwick Street is a residence located on the steep slope at the Southwick/Agawam Town Line. It has been selected for analysis because of its close proximity to Alternatives III and IV.

Location 5 - 387 Southwick Street is a residence dominated largely by noise from traffic on existing Route 57 (Southwick Street). Under Alternatives III and IV, sound levels at this location will presumably be reduced as a result of the diversion of traffic away from Southwick Street.

Location 6 - 92 Southwick Street is a residence located approximately 1000 ft. west of South Westfield Street. Sound levels at this location are dominated by traffic along existing Route 57 (Southwick Street). Similar to Location 5, traffic sound levels under Alternatives III and IV should be reduced.

Location 7 - 106 South Westfield Street is a residence located on South Westfield Street approximately 1000 ft. south of the Route 57 intersection. Sound levels at this location are currently dominated by traffic along South Westfield Street. This location was selected to assess the impact of increased traffic noise expected under the no-build Alternative I.

Location 8 - South West Street was selected as it lies close to Alternative III. Sound levels at this location would also be affected by traffic in Alternative IV. Sound levels at this location are presently dominated by traffic along South West Street.

Location 9 - New Hendom Heights Development should experience sound levels which are typical of those expected to occur at residences in this new development. Presently, five dwellings are constructed. No background sound level measurements were conducted at this location because background sound levels should be approximately the same as those measured at Location 2. This location has been selected for study because of its proximity to Alternatives III and IV.

Location 10 - 662 Southwick Street is a residence situated about 300 feet from the Southwick/Agawam Town Line, equidistant between Alternatives III and IV. Sound levels are dominated largely by traffic along Southwick Street. It was selected to assess the expected increase in sound level at this location under Alternatives III and IV.

Location 11 - 123 South West Street is a residence situated near Alternative IV. Sound levels at this location are currently dominated by traffic along South West Street. This location was selected because of its proximity to Alternative IV.

Location 12 - Pheasant Hill Village Apartments, 24 - 34 Paul Revere Drive is a multi-unit dwelling situated within an apartment complex. It is approximately 400 feet east of South West Street. Currently, sound levels at this location are dominated by traffic along South West Street. This location was chosen to assess the change in sound levels at this complex under Alternatives III and IV.

It was noted during field studies that all locations in the study area are periodically impacted by aircraft from Westover Air Force Base.

In order to assess existing sound levels, sound level measurements were conducted at Locations 1 through 7 over 24 hour periods and at locations 10 through 12 during peak traffic hours (3:30 - 6:30 PM). Normally, the impact analysis of highway projects is based on peak traffic hour which usually corresponds to the highest sound level occurring during the day. Because of the relatively low traffic volumes and distances from major roads, highest sound levels measured at some study locations did not necessarily correspond to peak traffic periods. This is particularly true at more remote locations such as Locations 1 and 2 which are far from significant roadway arterials.

4. Analysis

Normally, the impact analysis of highway projects is based on the peak traffic noise hour which is when the highest sound level occurs during the day. These will coincide if traffic flow conditions during the peak traffic hour correspond to a Level of Service "C" condition or better. If traffic conditions during the peak traffic volume hour are worse than Level of Service "C", peak traffic noise and peak traffic volumes will not be the same; rather, the peak traffic noise hour will occur some time earlier or later when traffic volumes are somewhat lower and traffic flow conditions correspond to a Level of Service "C" condition.

The peak traffic volume hour occurs between 4:30 and 5:30 PM on a typical weekday. Since peak hour volumes did not correspond to flow conditions worse than Level of Service "C", the peak traffic noise hour is the same as the peak traffic volume hour. Due to relatively low traffic volumes and distances from major roads, highest sound levels measured at study locations far from major roads did not necessarily correspond to peak traffic periods. This is particularly true at Locations 1 and 2.

Equivalent sound levels measured for the periods 4:00 to 5:00 PM and 5:00 to 6:00 PM which differ by only a small amount, have been averaged to arrive at an estimated 4:30 to 5:30 PM hourly equivalent sound level. Measured peak hour sound levels are presented in Table IV-7 and illustrated on Figure V-11.

TABLE IV-7

MEASURED AND ESTIMATED EXISTING SOUND LEVELS AT STUDY LOCATIONS

LOCATION[2]	UNITS REPRESENTED NUMBER OF BUILDINGS RESIDENTIAL	INSTITUTIONAL	COMMERCIAL	Existing Meas. Leq(1hr)[1] dBA	Existing Est. Leq(1hr) dBA
1. 7 Hendom Drive	8	0	0	51	52
2. 143 Hendom Drive	19	0	0	43	44
3. 271 S. West St.	8	0	0	62	60
4. 675 Southwick St.	1	0	0	49[3]	46
5. 387 Southwick St.	20	0	1	65	67
6. 92 Southwick St.	43	0	11	67	66
7. 106 S. Westfield St.	22	5	4	63	64
8. South West St.	5	0	0	57[4]	55
9. New Hendom Heights	12	0	0	43[5]	44
10. 662 Southwick St.	1	0	0	60[6]	61
11. 123 South West St.	3	0	0	56[6]	57
12. Pheasant Hill Vil.	33	0	0	47[6]	46

[1]Leq (1 hour) shown is an arithmetic average of Leq (1 hour) values measured over the period 4:00 - 6:00 PM except as otherwise noted.

[2]All locations are Category B land use activities which include residences. (Refer to Table V-11 for definitions.

[3]Measured Leq (1 hour) for period 4:00 - 5:00 PM only.

[4]Estimated based on sound level measurements at Location 3.

[5]Estimated based on sound level measurements at Location 2.

[6]Leq (1 hour) based on 1/2 hour measurements between 4:30 PM and 5:30 PM.

L. HISTORICAL AND ARCHAEOLOGICAL

1. Prehistoric

A locational survey (Phase I), which included background research and subsurface field testing was conducted the University of Massachusetts Archaeological Services (UMASS) within the proposed impact limits of Alternatives II and III. The survey disclosed the locations of two (2) prehistoric sites; one site was identified within the proposed limits of Alternative II and the other was discovered within the proposed right of way associated with Alternative III. UMASS recommended in a report that the two sites be subjected to site examinations (Phase II). After reviewing the UMASS findings and recommendations, MHD and MHC concurred that the two prehistoric sites warranted Phase II site examinations for evaluating site significance and eligibility for listing in the National Register (See MHC correspondence dated July 21, 1989 in Technical Appendix).

Alternative II was subsequently abandoned and replaced with a new Alternative IV. As a result, UMASS was directed to proceed with a Phase II investigation of the prehistoric site identified within Alternative III and to perform a Phase I locational survey within the proposed limits of Alternative IV.

At the outset, Alternative IV was considered to offer high potential for identifying prehistoric sites. However, the field investigations conducted by UMASS yielded only one prehistoric artifact, a stemmed projectile point, and a scatter of Nineteenth and Twentieth century refuse. Subsurface testing disclosed that much of the project area has been disturbed by agricultural activities. Based on the results of their findings, UMASS recommended in a report that no additional archaeological work was warranted within the limits of Alternative IV. MHD and MHC concurred with UMASS's recommendations for no further archaeological work. (See MHC correspondence dated April 26, 1991 in Technical Appendix).

The Phase II site examination of the prehistoric site located within Alternative III yielded a small number of prehistoric artifacts including a small stemmed projectile point, a bifacial fragment and a possible edge tool. No cultural features were encountered. The site was interpreted by UMASS as a small, interior hunting camp occupied during the Late Archaic Period. Based on the features, and the lack of site integrity, UMASS considered the site ineligible for inclusion in the National Register. MHC concurred with UMASS's recommendation and rendered a determination of Not Eligible. (See MHC correspondence dated April 26, 1991 in Technical Appendix).

2. Historic

No standing structures, surface features, or visible remains of potential historical significance were identified by UMASS within any of the proposed Design Alternatives.

M. AREA WIDE ENVIRONMENT

The Towns of Agawam and Southwick are influenced by long standing suburbanization trends as they transition from predominantly agricultural communities.

The ongoing trend towards suburbanization in Agawam and Southwick are reflected in recent population changes. Between 1970 and 1980, the population of Agawam increased by 21.0 percent and the population of Southwick increased by 16.0 percent, while the population of Hampden County as a whole decreased by 3.5 percent. Similarly, between 1980 and 1990, the population of Agawam and Southwick increased by 4.0 percent and 3.9 percent respectively, while the population of Hampden County increased by 3.0 percent.

The population projections by the Pioneer Valley Planning Commission for year 2000 indicate that the population of Agawam will increase by about 5%; the population of Southwick will increase by about 3%; and the population of Hampden County will increase by about 2%.

THIS PAGE INTENTIONALLY LEFT BLANK

V. ENVIRONMENTAL IMPACTS

A. TOPOGRAPHY

Under Alternatives III, III(a), IV or IV(a), excavations approaching a depth of 50 feet or more will be required as Relocated Route 57 passes through a steep hill west of South Westfield Street and through the Provin Mountain Ridge. Some of the excavated material can be used in constructing highway embankments, however, the project as a whole will generate a surplus of excavated material. The estimated volumes of excess excavated earthwork are as follows:

- 440,000 cu. yds. Alternative III
- 400,000 cu. yds. Alternative III(a)
- 160,000 cu. yds. Alternative IV
- 120,000 cu. yds. Alternative IV(a)

The adverse effects of truck traffic required to haul and dispose of this excess excavation are evaluated in Section III.E. Adverse effects of the increased erosion caused by this excavation are evaluated in Section V.B., and the adverse effects of fugitive dust are evaluated in Section V.I.

B. WATER QUALITY

1. Pollution Sources

Stormwater runoff will be discharged within the watershed of Still Brook and its tributaries, potentially affecting the quality of surface water in these streams.

Land uses which serve as non-point sources of pollutants, also affect surface water quality. The Still Brook watershed contains a variety of land uses including undeveloped, agricultural, and residential. As a result of the relocation of the highway, several acres of farmland will be lost. The reduction of farmland will result in a decrease in the nutrient, sediments, and toxic inputs associated with the farming activities. The contaminant burden in stormwater runoff is affected by the nature and volume of traffic and by maintenance practices. Common constituents of stormwater runoff and their principal sources are represented in Table V-1 on the following page.

TABLE V-1

COMMON HIGHWAY RUNOFF CONSTITUENTS AND THEIR PRIMARY SOURCES

Constituent	Primary Source
Particulates	Pavement wear, vehicles, atmosphere, highway maintenance
Nitrogen phosphorus	Atmosphere, roadside fertilizer application
Zinc	Tire wear (filler material), motor oil (stabilizing additive), grease
Iron	Autobody rust, steel highway structures (guardrails, etc.) moving engine parts
Copper	Metal plating, bearing and bushing wear, moving engine parts brake lining wear, fungicides and insecticides applied by maintenance operations
Cadmium	Tire wear (filler material), insecticide application
Chromium	Metal plating, moving engine parts, brake lining wear
Sodium	Deicing salts, grease
Chloride	Deicing salts

Source: Kobriger, N.P., T.V. Dupis and W.A. Kreutzberger, 1983. Guidelines for the management of highway runoff on wetlands. National Cooperative Highway Research Program Report 264, Transportation Research Board, National Research Council, Washington, D.C.

2. Impacts

Surface water samples collected in the project area were analyzed for the following parameters: Temperature, pH, Ammonia (NH3), Dissolved Sodium (Na), Dissolved Chlorides (C1), Heavy Metals (Ba & Ca), Total Suspended Solids (TSS), Petroleum Hydrocarbons (PHC), and Biochemical Oxygen Demand (BOD). The test results are shown in Section IV of this Report.

Temperature - Surface water temperatures recorded in the study area were within the MADEP standards for Class "A" and Class "B" waters. Surface water temperature generally is affected by direct discharges.

Stormwater runoff from paved areas may have slightly elevated temperature levels, however, any impact on existing streams would be limited to the immediate vicinity of the discharge.

pH - The pH serves as an important factor in the chemical and biological systems of natural waters. Change in pH affects the degree of dissociation of weak acids or bases which influence the toxicity of many compounds. Surface water samples #SW-23 and #SW-25 indicated slightly acidic waters; however, these values were not significantly different from the average range of pH at those sites. No change in pH is expected to result from the implementation of the Route 57 Relocation project.

Ammonia - Ammonia concentrations are of concern due to their known toxicity to aquatic life. A slight increase in pH (alkalinity) can increase ammonia concentrations by causing the transformation of the ammonium ion (NH4) to ammonia (NH3). Ammonia levels can also be increased through addition of fertilizers. Factors which can contribute to an increase in ammonia toxicity include a greater concentration of dissolved oxygen and carbon dioxide, increased temperature, and bicarbonate alkalinity. The loss of farmland due to the Route 57 Relocation Project will decrease the amount of fertilizers applied within the study area, potentially reducing the ammonia levels.

Chloride and Sodium - The practice of spreading deicing agents (typically sodium chloride) to improve roadway conditions during ice and snow storms is a documented source of sodium and chloride contamination in surface water bodies and ground water. High concentrations of sodium chloride can adversely affect aquatic life and drinking water. Chloride and sodium concentrations from deicing salts are primarily a function of the pavement areas, application rate, and dilution by ambient waters.

The impact of increased salt concentrations is most significant when they are allowed to accumulate in any particular area. Controlling the application rate is the most effective means of minimizing the amount of these pollutants. During final design of the drainage systems for Relocated Route 57, consideration will be given to locating drainage discharge points in locations which are well flushed, thus reducing the amount of salt which accumulates. With this mitigative measure, the surface waters should not be measurably impacted by chloride or sodium runoff.

Metals - Heavy metals are toxic to biota. The toxicity of heavy metals is dependent on several factors including their chemical state and concentration.

Sample analyses for heavy metals in the surface waters of the study area exhibited levels within the Massachusetts recommended criteria for Class "A" and Class "B" waters. The quantities of heavy metals anticipated to be introduced to surface water bodies as a result of highway operations will be small.

Suspended Solids - Turbidity is a measure of the extent to which suspended solids reduce the intensity of light passing through water. Excessive turbidity inhibits light penetration thereby limiting photosynthesis and reducing primary productivity. It also impacts aquatic life by causing abrasive injuries, clogged gills and destruction of spawning beds.

Substantial quantities of earthwork will be required during the construction phase of this project which will cause short term increases in suspended solids and turbidity. Soil erosion control measures during construction such as haybales, silt fences, and limiting barren areas will minimize soil loss and limit increases in turbidity.

Oil and Grease - Concentrations of 0.3 mg/l crude oil can be potentially lethal to fresh water fish populations. Oil of any type can coat the surface of fish gills thereby impairing respiration and increasing biochemical oxygen demand within the aquatic environment.

Vehicular traffic is a common source of oil and grease in stormwater runoff. Impacts to surface water can occur if a major spill event occurs.

The proposed highway construction does not include areas such as rest stops, service station or other developments which can contribute to potential spillage. Ordinary vehicular traffic is not expected to measurably increase oil and grease concentrations in surface waters.

3. Conclusion

Under Alternative I (No Build), increases in background traffic over time will cause slight increases in contaminant loadings.

Implementation of Alternatives III, III(a), IV, or IV(a) will cause increases in contaminant loadings comparable to the No Build Alternative.

Contaminant loadings are influenced by traffic volumes. On an area wide basis, the total volume of traffic using the Route 57 corridor will be comparable whether or not the proposed project is implemented. Thus the total contaminant loading on an area wide basis for most pollutants will be comparable, whether or not the proposed project is implemented.

Changes in concentrations of these pollutants in Still Brook and Leonard Pond will not be measurable. The paved area constructed under Alternatives III, III(a), IV, or IV(a) comprises a small percentage of the total watershed tributary to Still Brook and Leonard Pond. Thus stormwater runoff will constitute a small portion of the total surface water runoff affecting Still Brook and Leonard Pond. Any increase in changes in the quality of runoff from the new highway will be diluted by ambient waters.

Based upon implementation of the mitigating measures listed in Section VI of this Report and upon the relatively small incremental changes in contaminant loadings, the adverse impacts on water quality of implementing Alternatives III, III(a), IV, or IV(a) are not considered to be significant.

C. FLOODPLAINS

The proposed project will potentially affect flooding by: 1) placing fill within floodplains reducing their flood storage volume, 2) adding impervious surfaces which will increase the peak rate and total volume of stormwater runoff, and 3) placing embankments which could constrict flows and inundate upstream areas.

Areas of floodplain encroachment at each stream crossing are shown in Figure V-1. These floodplain crossings typically occur within wetlands. For consistency, the Floodplain Areas have been assigned the same numerical designations as the Wetland Areas. Total impacted areas and volumes are listed in Table V-2.

There are two types of floodplains in the project area, 1) floodplains delineated by the Flood Insurance Administration (FIA) which are Federally protected and 2) floodplains determined by hydrologic analysis which are protected under the Massachusetts Wetlands Protection Act.

As indicated in Table V-2, Alternatives III and IV involve filling approximately 0.18 acres of the FIA delineated floodplain which lies along Still Brook. Alternatives III and IV also require filling of approximately 0.85 and 1.43 acres respectively, of the calculated 100 year floodplain at stream crossings. The volume of fill placed within the floodplain under Alternatives III(a) and IV(a) is the same within the FIA floodplain and slightly less within the calculated floodplain due to the reduction in filling in Floodplain #3.

TABLE V-2

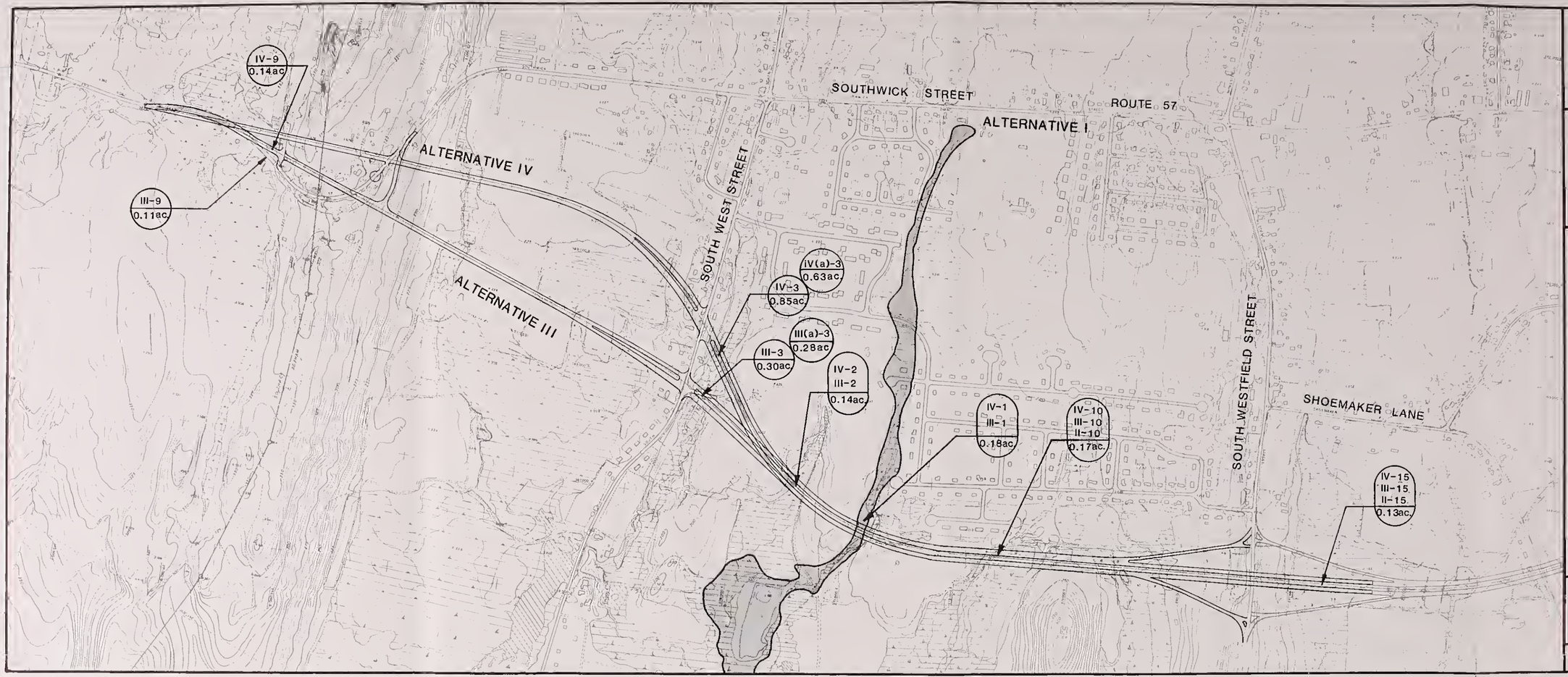
ROUTE 57 RELOCATION PROJECT
SUMMARY OF FLOODPLAIN FILL AREAS

Area of Floodplain Filled (Acres)	Floodplain No.	Alt. III	Alt. III(a) Bridge at South West	Alt. IV	Alt. IV(a) Bridge at South West
Area within FIA Floodplain	#1	0.18	0.18	0.18	0.18
Area within Calc. Floodplain	#2	0.14	0.14	0.14	0.14
Area within Calc. Floodplain	#3	0.30	0.28	0.85	0.63
Area within Calc. Floodplain	#9	0.11	0.11	0.14	0.14
Area within Calc. Floodplain	#10	0.17	0.17	0.17	0.17
Area within Calc. Floodplain	#15	0.13	0.13	0.13	0.13
Total Area Filled (Acres)		1.03	1.01	1.61	1.39
Storage Volume Displaced (Acre Feet)					
Volume within FIA Floodplain		0.47	0.31	1.35	0.90
Volume within Calc.Floodplain		0.58	0.58	0.60	0.60
Total Volume Displaced (Acre Feet)		1.05	0.89	1.95	1.50

The performance standard established under Executive Order 11988 and under the Massachusetts Wetlands Protection Act require that lost flood storage be replaced by excavating a compensatory flood storage area of equivalent volume along the same reach of the water course. In addition, DEP Regulations require that the compensatory flood storage be equivalent at each increment of elevation up to and including the level of inundation of the 100 year storm. Compensatory flood storage will be provided in the replacement wetlands. The area of wetland/flood storage proposed for construction is 11.2 to 12.0 acres which is substantially larger than the 0.85 to 1.43 acres of calculated floodplain plus the 0.18 acres of FIA floodplain proposed to be filled.

Highway projects may potentially affect flooding by adding impervious surfaces which increase stormwater runoff and by placing embankments which constrict flows and inundate upstream areas. During final design, stormwater detention facilities will be provided where appropriate to attenuate any increases in the peak rate of runoff which would increase flooding. The new drainage cross culverts will be designed to have adequate capacity to pass storm events without ponding water beyond the right-of-way. Their design will be subject to regulation as part of issuance of a 404 Permit and the Orders of Conditions.

The proposed stormwater management facilities will be designed to include stormwater detention facilities to attenuate peak rates of discharge, and the new culverts will have sufficient capacity to avoid ponding outside of the right-of-way. Accordingly, any adverse flooding effects are not considered to be significant. Fill will be placed within both the FIA delineated floodplain and the calculated 100 year floodplain. To compensate for the potential loss of flood storage, compensatory flood storage will be provided within the replacement wetland areas. Based upon the above, the adverse impacts on floodplains are not considered to be significant.



COMMONWEALTH OF MASSACHUSETTS
DEPARTMENT OF PUBLIC WORKS

ROUTE 57 RELOCATION

FLOODPLAIN ENCROACHMENTS

INDEX

☐ ESTIMATED 100 YEAR FLOODPLAIN BOUNDRY PER FEMA

(OTHER 100 YEAR FLOODPLAIN BOUNDRIES DETERMINED BY HYDROLOGIC ANALYSIS)

NOTE: EXCEPT FOR FLOODPLAIN AREA #3, THE INDICATED AREAS OF ENCROACHMENT FOR ALTERNATIVES III & IV ALSO APPLY FOR ALTERNATIVES III(a) & IV(a).

N

0 600 1200

HOR. SCALE IN FEET

FIG. NO.V-1

D. WETLANDS

1. Federal and Massachusetts Jurisdiction and Requirements

The filling of wetlands will be necessary to construct the proposed project and will require a permit from the United States Army, Corps of Engineers (USACE) under Section 404 of the Federal Clean Water Act. Permits for highways are processed through the three step USACE Highway Methodology. The alternatives and measures to minimize and compensate for adverse impacts developed under the USACE Highway Methodology are also incorporated in this Draft Supplemental Environmental Impact Report (SEIR).

Under Purpose and Need, the Corps formally defines the Purpose of the Project and establishes the general scope of the alternatives analysis. The Project Purpose is defined broadly, to ensure that a full range of practicable alternatives is evaluated. On October 3, 1990, the Corps of Engineers completed Step 1 of the USACE Highway Methodology by defining the Purpose and Need of the Project, as follows: the "*...purpose of the project is to resolve long standing safety and capacity deficiencies, in traffic operations and access, on existing Route 57 in Agawam, Massachusetts and to provide increased traffic capacity while moving traffic along an east-west corridor.*"[1]

Phase I - Avoidance of the USACE Highway Methodology (Step 2) establishes whether it is possible to avoid wetland loss by systematically exploring a wide range of alternatives. Phase I is the first iteration in the analysis of alternatives versus constraints (wetlands, historical sites, developed areas, etc.) and includes a test of practicability. The Corps completed Phase I on May 15, 1992 when it determined that only Alternatives III/III(a) and IV/IV(a) are practicable and should be carried forward into Phase II.[2]

Phase II of the USACE Highway Methodology (Step 3) is the second iteration in the evaluation of alternatives and is ongoing. The more detailed evaluation of the Phase II alternatives is complete and this information is incorporated in this Draft SEIR and serves as the basis for selecting the Least Environmentally Damaging Practicable Alternative (LEDPA). A formal application for a Department of the Army Permit under Section 404 of the Clean Water Act will be submitted to the Corps of Engineers by MHD and the Corps will issue a Public Notice. MHD and the Corps of Engineers will hold a joint Public Hearing during the MEPA comment period on this Draft SEIR and the Public Notice by the Corps for the 404 Permit Application.

Following the Public Hearing and issuance of the Certificate on this Draft SEIR by the Secretary of the Executive Office of Environmental Affairs, Phase II of the USACE Highway Methodology will conclude when the Corps selects the LEDPA. Preparation of the 25 percent design documents will be coordinated with USACE minimization requirements. Measures such as increasing slope steepness and reducing the roadway section will be evaluated. Minimization efforts will be summarized and included in the Final SEIR and submitted to the Corps of Engineers.

[1] William F. Lawless, PE, October 3, 1990, op.cit.

[2] William F. Lawless, PE, May 15, 1992, op.cit.

Regardless of whether Alternative III, III(a), IV, or IV(a) is selected, unavoidable wetland losses will occur. Compensation for wetland loss involves construction of replicated wetlands. The Corps typically addresses compensation following minimization. Massachusetts DEP Regulations governing preparation of this SEIR require that mitigating measures be developed and evaluated in this document. Accordingly, key mitigating measures have been identified and included in this Draft SEIR, including conceptual wetland replacement Areas A through F.

As part of the 25 percent design documents, the viability of the preliminary wetland replication areas indicated in the Draft SEIR will be confirmed and more detailed plans of the wetland replication areas will be prepared for the mitigation areas associated with the LEDPA. The plans will depict excavation limits, hydraulic modifications, and planting requirements. To ensure the availability of groundwater to the root zone of the plants, groundwater monitoring wells will be installed and monitored.

Following completion of all environmental documentation, the Corps will determine whether to issue the Section 404 Permit. Following permit issuance, monitoring may be required which may extend through construction and beyond.

In order for a 404 Permit to be issued, the following 404(b)1 guidelines must be met:

- there must be no less damaging, practical alternatives to wetland taking available;

- the activity must not violate applicable water quality standards or threaten an endangered species;

- there must not be significant degradation of waters of the United States; and

- all reasonable practicable steps must be taken to minimize adverse effects on the aquatic environment.

A Section 401 Water Quality Certificate is required from the DEP's Division of Water Pollution Control (DWPC) prior to Permit issuance.

The decision whether to issue a Section 404 Permit is based on an evaluation of probable impacts, including cumulative impacts of the proposed activity and its intended use on the public interest. Part of the general criteria considered in the evaluation of every application includes the relative extent of the public and private need for the proposed project (33 CFR 320.4)

The wetlands between South West Street and the Agawam/Southwick Town Line are of particular concern because they are tributary to Leonard Pond, a scenic and pristine water body. The US EPA, recognizing Leonard Pond's high value as wildlife habitat and its potential to provide flood storage, has proposed to provide protection for these wetlands under Section 404(c) of the Federal Clean Water Act. Plans for formal designation as a 404(c) area are under evaluation. The 404(c) boundary encompasses Wetlands No. 4, 5, 6, and 7. It is anticipated that the U.S. EPA will proceed with the 404(c) designation should any action be proposed which causes unacceptable impacts on wetland resources.

The alteration of wetlands is also subject to regulation under the provisions of the Massachusetts Wetlands Protection Act (M.G.L. c131, s40), cited as "The Act". Under the Massachusetts Department of Environmental Protection (DEP) Regulations implementing the Act, wetlands are regulated "Resource Areas". Prior to filling or other alteration of these Wetlands, MHD will apply for a variance to DEP with a copy sent to the Agawam and Southwick Conservation Commissions.

Regulations controlling the filling or alteration of wetlands in the project area have been promulgated at both the Federal and State levels. Accordingly, the identification and evaluation of wetland impacts included in this Section are divided into two parts. Subsections D.2 and D.3 evaluate impacts to wetland resources used by the USACE and the Federal Resource agencies. Subsections D.4 and D.5 evaluate impacts to wetlands based upon consideration of whether alteration of "Resource Areas" as defined in DEP Regulations is consistent with the protection of the eight statutorily defined "Interests" of the Massachusetts Wetlands Protection Act.

2. Wetlands - Federal Clean Water Act

Highways can affect wetland functions primarily through their impact on water regime, sediment loading, and direct habitat loss. Relatively little quantitative data has been published on impacts of highways on wetland hydrologic functions or ecological effects of highway runoff. Highway activities most responsible for impacts to wetlands include sediment runoff (particularly from construction); fill (including associated alteration of circulation and movements of fish and wildlife); channel modifications (including straightening, deepening, and widening); water level changes (including increases and decreases resulting from inadequate drainage culverts, water table alteration or increased runoff); introduction of contamination in stormwater; vegetation clearing; and disturbance to wildlife.

Summaries of fill areas for the Build Alternatives are presented in Table V-3, and Figure V-2 indicates the wetland impact areas.

Alternative III - Implementation of this alternative requires the filling of 9.2 acres of wetland. Impacts to the portions of wetlands remaining after the construction of the highway include a decrease in the areas' aquatic diversity and a decrease in the areas' ability to support wildlife during breeding periods. This impact is due to the direct loss of habitat associated with the relocation of the highway.

The effectiveness for Area #15 to function as a sediment and toxicant retention area will be lessened after construction. A portion of Area #11 will be filled resulting in the loss of vegetation. This will decrease the areas' ability to retain or transform nutrients.

The impact areas for Wetland Areas #4 and 9 exhibit a low effectiveness rating while the existing areas exhibit a high rating for sediment/ toxicant retention. The same is true for Wetland Areas #4, 5, 6, 10 and 13 for nutrient removal/transformation. Wetland Area #13 exhibits a high opportunity for performing the functions of nutrient removal and transformation while the 0.11 acre impact area exhibits a low rating. The impacts to the wetland will be minimal because filling will occur in areas which exhibit a low rating for these functions.

Under Alternative III, 2.97 acres of Wetland Area #11 will be filled. The effectiveness of Area #4 and 7 to support bird species during breeding, and fish and invertebrate species on site, will be minimally affected. The bridging of Areas #4 and 7 will minimize effects on the aquatic environment. Mitigating measures include the bridging of Wetlands #4, 5, 6 and 7 and construction of wetland replacement areas. These replacement areas will be designed to replicate and replace the functions and values of the wetland areas impacted by filling.

Alternative III(a) - Implementation of Alternative III(a) will require the filling of about 9.0 acres of wetland. Alternative III(a) will impact the same wetlands as Alternative III and the areas of fill will be the same except for Wetlands #3. Accordingly, the impacts resulting from these fills are the same as for Alternative III. The area of fill under Alternative III(a) within Wetland #3, which is in close proximity of the proposed bridge at South West Street, is 0.3 acres versus 0.5 acres under Alternative III.

Alternative IV - Approximately 10.3 acres of wetland will be filled under Alternative IV, which is over one acre more than under Alternative III. The analysis for Alternative IV indicates that this more northerly crossing of Wetland Areas #7 and 9 will have a lesser impact on wildlife breeding habitat than Alternative III. Wetland Areas #7 and 9 which are affected by Alternative IV exhibit a low rating for wildlife functions while the impact areas for Alternative III are rated high. Alternative IV will also have less of an impact on the ability for Wetland Area #9 to support a diversity of fish or invertebrates.

Although over an acre more of wetland will be filled under Alternative IV than under Alternative III, the habitat value of the wetlands impacted west of South West Street is somewhat less. Alternative IV utilizes a more northerly alignment and it crosses the wetlands west of South West Street nearer to their headwaters where the habitat is less effective in supporting fish, invertebrates, and wetland dependent birds during breeding seasons. Similar to Alternative III, Alternative IV calls for the bridging of Wetland #7.

Alternative IV(a) - Implementation of Alternative IV(a) requires filling about 9.9 total acres of wetland. Alternative IV(a) will impact the same wetlands as Alternative IV. The areas of fill and the resulting impacts will be the same for Wetlands #1, 2, 9, 10, 11, 12, 13, 14 and 15. Under Alternative IV(a), the area of fill within Wetland #3, which is in close proximity of the proposed bridge at South West Street, is 0.6 acres versus 1.1 acres under Alternative IV.

3. Wildlife - Federal Clean Water Act

Wildlife values for the affected wetlands were evaluated based on the effectiveness of each particular wetland or impact area to support a variety of wildlife species during breeding, migration and wintering.

Wetland areas affected by the Build Alternatives generally display a moderate to high value for wildlife breeding, migration and wintering. These values are related to the size, surrounding land use, community interspersion, and vegetation characteristics of the wetland areas. Wetlands within the study area are primarily within an agricultural community, have a surplus of precipitation and have good diversity in their plant community. These factors contribute to a high or moderate effectiveness value for these areas. Those wetlands which exhibited low values for wildlife breeding, migrating, and wintering were deficient in one or more of the above mentioned categories.

Wildlife related impacts associated with the Relocation of Route 57 include the displacement of wildlife, the loss of wildlife and wildlife habitat, and alteration of the species composition within affected areas.

The proposed highway will act as a barrier for some mammals and reptiles, and may lower the carrying capacity and distribution of some species. The loss of wetland habitat associated with the proposed project will result in ecological changes in the areas adjacent to the highway. Mitigating measures to reduce these long term impacts suggested by the Massachusetts Natural Heritage Program include construction of shelf culverts and viaducts to enable small wildlife species to cross the highway. During final design, the feasibility of incorporating the mitigating measures suggested by the Natural Heritage Program will be evaluated.

Wildlife species, especially birds and small mammals, will be temporarily displaced during construction activities but are expected to return to the area once construction has been completed. Wetland mitigation areas will be designed with vegetation which will provide food as well as cover; regaining some of the short-term losses associated with the project.

Alternatives III and III(a) - These Alternatives will not bisect large contiguous wetland areas and will therefore cause only minor impacts on interdependent wildlife communities. This alignment does cross Wetland Areas No. 4, 5, 6 and 7; identified by the EPA as included in the Leonard Pond wetland system. It is anticipated that bridges, culverts or other measures will be used to minimize loss of wetlands. These structures will also provide openings to minimize the barrier efforts of the roadway.

Alternative IV and IV(a) - These Alternatives will cause even less impacts on wildlife because crossings will occur in wetland areas at narrower locations and at headwater areas. These Alternatives also will minimize impacts to the Leonard Pond system and wildlife by using bridges, culvert or other measures to reduce wetland fill at Wetland Area No. 7.

TABLE V-3

ROUTE 57 RELOCATION PROJECT
FEDERALLY DEFINED WETLANDS IMPACTED
SUMMARY OF TYPES AND AREAS (ACRES)

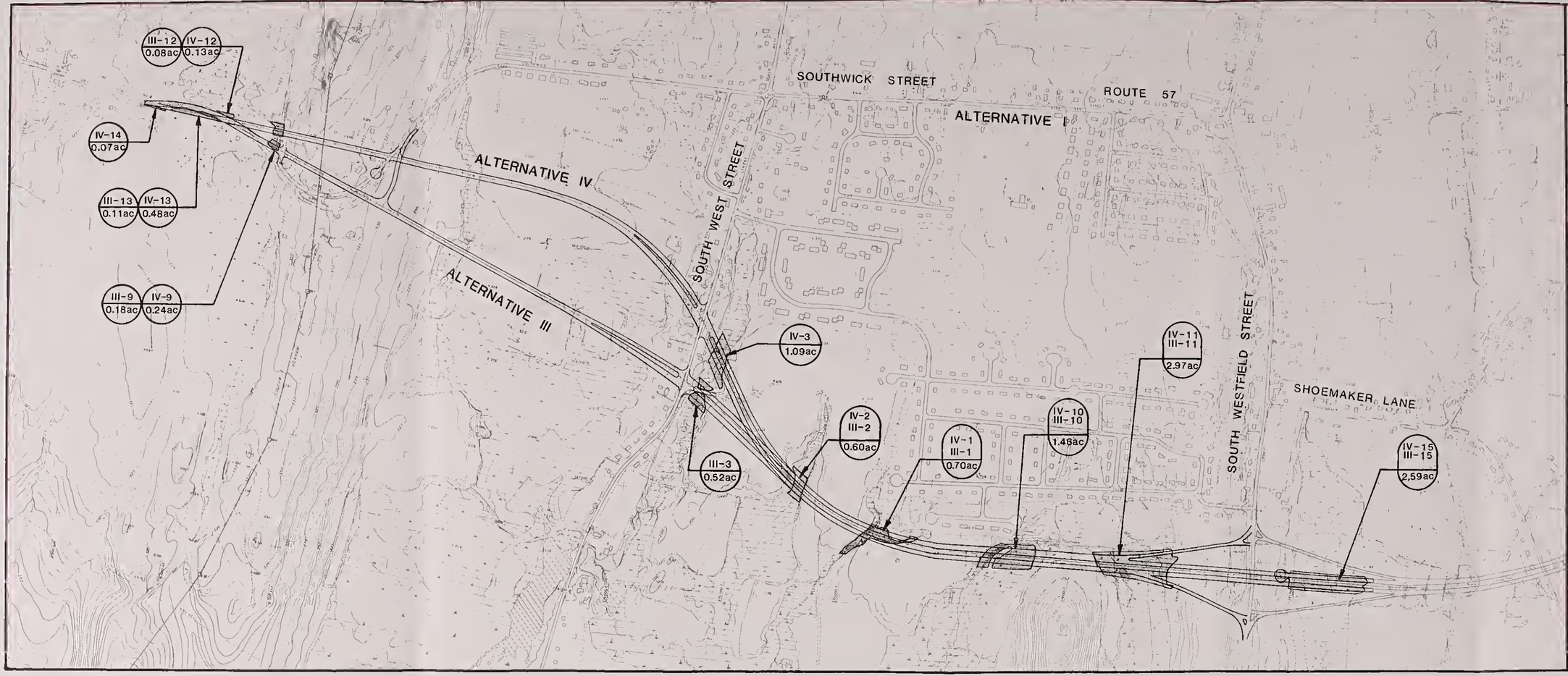
TOTAL WETLAND NO.	WETLAND TYPE	TOTAL EXISTING AREA	ALT. III FILLED AREA	ALT.III(a) BRIDGE @ S.WEST ST. FILLED AREA	ALT. IV FILLED AREA	ALT.IV(a) BRIDGE @ S.WEST ST. FILLED AREA
1	PF	6.51	0.70	0.70	0.70	0.70
2	PF, PE	16.20	0.60	0.60	0.60	0.60
3	PF, PE	12.36	0.52	0.27	1.09	0.64
4	PF	11.49	BRIDGE	BRIDGE	0	0
5	PF	3.14	BRIDGE	BRIDGE	0	0
6	PF	1.47	BRIDGE	BRIDGE	0	0
7	PF, PE, PO	5.48	BRIDGE	BRIDGE	BRIDGE	BRIDGE
8	PF, PO	43.26[2]	0	0	0	0
9	PF, PE	1.45	0.18	0.18	0.24	0.24
10	PF, PE	17.58[1]	1.46	1.46	1.46	1.46
11	PF, PE, PO	19.59[1]	2.97	2.97	2.97	2.97
12	PF	5.06	0.08	0.08	0.13	0.13
13	PF	4.01	0.11	0.11	0.48	0.48
14	PF	0.07	0	0	0.07	0.07
15	PF, PE	23.35	2.59	2.59	2.59	2.59
TOTAL AREA FILLED (ACRES)			9.21	8.96	10.33	9.88

WETLAND TYPES

PF (PALUSTRINE FORESTED)
PE (PALUSTRINE EMERGENT)
PO (PALUSTRINE OPEN WATER)

[1] PARTIAL AREA, WETLAND EXTENDS BEYOND LIMITS OF MAPPING.

[2] IMPACTED BY DISCARDED ALTERNATIVE II, ONLY.



COMMONWEALTH OF MASSACHUSETTS
DEPARTMENT OF PUBLIC WORKS

ROUTE 57 RELOCATION

WETLAND IMPACT AREAS

KEY

X/# — X-AREA DESIGNATION

#-SIZE (ACRES) WETLAND IMPACT AREAS

EXCEPT FOR WETLAND AREA #3 THE INDICATED AREAS OF IMPACT FOR ALTERNATIVES III & IV ALSO APPLY FOR ALTERNATIVES III(a) & IV(a).

N

0 600 1200

HOR. SCALE IN FEET

FIG. NO. V-2

4. Resource Area Impact Evaluation - MA Wetlands Protection Act

The Massachusetts Wetland Protection Act (the Act) sets forth eight statutorily defined "Interests" which include: (1) protection of water supply, (2) protection of groundwater supply, (3) flood control, (4) storm damage prevention, (5) prevention of pollution, (6) protection of fisheries, (7) protection of land containing shellfish, and (8) protection of wildlife habitat. The Act identifies certain "Resource Areas" which include "Bordering Vegetated Wetlands, Land Under Water, Banks, and Land Subject to Flooding". Because their alteration is presumed to affect the Interests of the Act, any work within these Resource Areas is subject to regulation. In addition to these resource areas, work within the 100 foot wide buffer strips surrounding bordering vegetated wetlands and water bodies is also subject to regulation under the Act.

Implementation of Alternatives III, III(a), IV, or IV(a) will involve construction of the highway within bordering vegetated wetlands and buffer zones. Any of the Build Alternatives also require culverting and relocation of streams, which constitutes the alteration of Land Under Water and their Banks.

The impacts of implementing Alternatives III, III(a), IV, or IV(a) on the "Resource Areas" subject to regulation under the Act are summarized in Table V-4. The Resource Areas impacted are indicated in Figure V-2.

Under Alternatives III, III(a), IV, and IV(a), Wetland Resource Area No. 15 will be impacted by the filling of 2.57 acres of Bordering Vegetated Wetland and alteration of 0.02 acres of Land Under Water. An existing stream will be culverted under the new highway and work will be performed in its Buffer Zone. This work will be done as part of the Phase II construction contract, however, this work is included in the Superseding Order of Conditions issued by Massachusetts DEP for the Phase I Project. The replacement wetland to mitigate for the filling of Area No. 15 is also included in the replacement wetland areas constructed under the Phase I Project. The work is not, however, included in the COE Section 404 Permit for Phase I. Therefore, these 2.57 acres of Bordering Vegetated Wetland and 0.02 acres of Land Under Water are not included in the project totals for resources impacted by Phase II in Table V-4, but they are included in the project totals under the Federal definition. MHD has agreed to include mitigation for the fill in Wetland No. 15 in both Phase I and Phase II. If Phases I and II are considered cumulatively, the result is an excess of replacement wetlands with a ratio well in excess of 1 for 1.

Wetland Resource Areas No. 10 and 11 both exceed 20 acres in area and include both wooded swamps an emergent areas. These Resource Areas contain streams which are tributary to Still Brook, but they are not part of the Leonard Pond system. The alignment of Alternatives III, III(a), IV and IV(a) is identical through these Resource Areas. Each Alternative will require the filling of approximately 1.4 and 2.8 acres of Bordering Vegetated Wetland in Areas No. 10 and 11, respectively. Work will be performed in the Buffer Zones around each wetland. Each of these wetlands contain a southerly flowing stream which must be culverted beneath the proposed highway embankment. The culverting of these streams involves the alteration of Banks and Land Under Water. Each Resource Area contains Land Subject to Flooding which will be impacted by the placement of fill for the highway embankment.

Wetland Resource Area No. 1 is a wooded swamp containing over 6 acres and borders a stream which are tributary to Still Brook, but it is not part of the Leonard Pond system. Each Build Alternative will require the filling of about 0.7 acres of Bordering Vegetated Wetland and work in its contiguous Buffer Zone. The culverting of the stream results in the alteration of Land Under Water and the loss of about 400 feet of Bank. Filling will result in the loss of 0.18 acres of Land Subject to Flooding.

Wetland Resource Area No. 2 as a whole contains over 16 acres and includes both wooded swamp and emergent areas. Each Build Alternative will require the filling of 0.6 acres of Bordering Vegetated Wetland and alteration of the adjacent Buffer Zone. All the Build Alternatives will also impact 0.14 acres of Land Subject to Flooding in this Area.

Wetland Resource Area No. 3 contains a total of over 12 acres of land and includes both wooded swamp and emergent areas. The Resource Area contains a stream which is a tributary to Still Brook, but is not part of the Leonard Pond system. Alternatives III and III(a) cross the area to the south of Alternative IV and require the filling of about 0.5 and 0.3 acres respectively of Bordering Vegetated Wetland and Land Under Water. Alternatives IV and IV(a) require the filling of about 1.1 and 0.6 acres respectively of Bordering Vegetated Wetland and work in its Buffer Zone. Although the total fill is higher under Alternative IV and IV(a), the fill is placed nearer the northerly limit of the wetland and is less sensitive than the area filled under Alternatives III and III(a). Resource Area No. 3 contains a stream which must be culverted and Land Subject to Flooding which will be filled.

Wetland Resource Areas No. 4, 5, 6, and 7 are part of the Leonard Pond system. Structures including bridges or culverts will be utilized to minimize filling of these wetlands under all Build Alternatives.

Wetland Resource Area No. 8 is not impacted by Alternatives III, III(a), IV, or IV(a).

Wetland Resource Area No. 9 encompasses about 1.5 acres and includes both wooded swamp and emergent areas. It borders a stream which will be altered. Alternatives III and III(a) will fill about 0.1 acres of Bordering Vegetated Wetland and Alternatives IV and IV(a) will fill about 0.2 acres. All Build Alternatives will alter the Buffer Zone.

Wetland Resource Areas No. 12, 13, and 14 are wooded swamps which lie adjacent to existing Route 57 near the Agawam/Southwick Town Line. Construction of any of the Build Alternatives will alter the Buffer Zones surrounding these wetlands. Alternatives III and III(a) fill a total of about 0.2 acres of Bordering Vegetated Wetland and Alternatives IV and IV(a) fill a total of 0.7 acres. These areas do not contain streams or Land Subject to Flooding.

TABLE V-4

MASSACHUSETTS WETLANDS PROTECTION ACT
SUMMARY OF IMPACTS ON RESOURCE AREAS

		Alternatives III and III(a)				Alternatives IV and IV(a)			
Resource Area No.	Total Exist. Area (Acres)	Bordering Vegetated Wetland (Acres)	Land Under Water (Acres)	Land Subj. to Flooding (Acres)	Bank (LF)	Bordering Vegetated Wetland (Acres)	Land Under Water (Acres)	Land Subj. to Flooding (Acres)	Bank (LF)
1	6.51	0.64	0.06	0.18	400	0.64	0.06	0.18	400
2	16.20	0.60	-	0.14	-	0.60	-	0.14	-
3	12.36	0.44	0.08	0.30	250	0.87	0.22	0.85	320[A]
3	12.36	0.19	0.08	0.30	250	0.42	0.22	0.85	320[B]
4	11.49	-	-	-	-	-	-	-	-
5	3.14	-	-	-	-	-	-	-	-
6	1.47	-	-	-	-	-	-	-	-
7	5.48	-	-	-	-	-	-	-	-
8	43.26**	-	-	-	-	-	-	-	-
9	1.45	0.07	0.11	0.10	200	0.16	0.08	0.13	220
10	17.58*	1.40	0.06	0.17	480	1.40	0.06	0.17	480
11	19.59*	2.83	0.14	-	190	2.83	0.14	-	190
12	5.06	0.08	-	-	-	0.13	-	-	-
13	4.01	0.11	-	-	-	0.48	-	-	-
14	0.07	-	-	-	-	0.07	-	-	-
15	23.35	(2.57)	(0.02)	(0.13)	(310)	(2.57)	(0.02)	(0.13)	(310) [C]
TOTALS		6.17	0.45	0.89	1,520	7.18	0.56	1.47	1,610 [A]
TOTALS		5.92	0.45	0.89	1,520	6.73	0.56	1.47	1,610 [B]

* Partial Area, Wetlands Extend Beyond Mapping Limits.
** Impacted by Discarded Alternative II Only.

[A] For Alternatives III & IV Only.
[B] For Alternatives III(a) & IV(a) Only.
[C] Included in MA DEP Superseding Order of Conditions for Phase I Project, Not Included in Totals Shown

5. Wildlife - Massachusetts Wetlands Protection Act

The alteration of Resource Areas by implementation of Alternatives III, III(a), IV, or IV(a) will affect wildlife habitat. Wildlife Habitat is a statutorily defined "Interest" of the Massachusetts Wetlands Protection Act and is protected when the habitat lies within Bordering Vegetated Wetlands, Land Under Water, Banks or Land Subject to Flooding.

Wetland No. 15 has a diverse habitat including both wooded swamp, emergent areas, and a stream. Its habitat value has been diminished by the construction of highway ramps under Phase I of the Route 57 Relocation. Wetlands No. 1, 2, 3, 10, and 11 which lie between South Westfield and South West Streets contain a diversity of habitat including both wooded swamps and emergent areas. All these wetlands contain streams, except Wetland No. 2. These wetlands are large, ranging from 6 to over 20 acres in size, and are contiguous with large undeveloped upland areas.

Alternatives III, III(a), IV, and IV(a) generally follow the same alignment through the Resource Areas and have comparable effects on wildlife habitat. Although these wetlands are part of a contiguous open space area and provide a diversity of habitat, construction of the Build Alternatives is not considered to have substantive adverse effects on wildlife habitat because the highway is confined to the northerly portion of this open space area, closest to existing developed areas. The Build Alternatives cross the Bordering Vegetated Wetlands near to their headwaters where their habitat value is less.

Alternatives III, III(a), IV and IV(a) will also impact Wetland Areas No. 12, 13, and 14 which are located near existing Route 57 in Southwick. Implementation of any of the Build Alternatives will not have significant adverse effects on wildlife habitat because these wetlands do not provide a diversity of habitat such as emergent areas and streams, and their value as habitat is already diminished by the proximity of existing Route 57.

Wetland Areas No. 4, 5, 6, and 7 are part of a large contiguous tract of open space which is contiguous to Leonard Pond. Although these wetlands are part of contiguous open space area, construction of the Build Alternatives is not considered to have substantive adverse effects on wildlife habitat. The loss of Bordering Vegetated Wetland will be minimized through use of bridges and large culverts. These structures will also be designed to accommodate the passage of wildlife effectively minimizing the barrier effects of the highway. In addition, the potential effects of the highway on wildlife habitat is minimized because the highway is located in the northerly portion of this open space area, closest to existing developed areas. It crosses the Bordering Vegetated Wetlands near their headwaters where their habitat value is less.

The Massachusetts Wetlands Protection Act provides that no project may have an adverse effect on local population of rare, "state listed" vertebrate or invertebrate animal species (301 CMR 10.59). In their letter to MHD on September 22, 1988, the Massachusetts Natural Heritage Program noted that Spotted Turtles occur in Leonard Pond and that Four-toed Salamanders, Jefferson Salamanders, and Eastern Box Turtles are in the vicinity of the stream passing through Wetland Area No. 9. Because Alternatives III, III(a), IV, or IV(a) will utilize structures to minimize loss of Bordering Vegetated Wetland and will cross wetlands near their upper limits, no adverse effects will occur on these state listed species of special concern.

6. Variance - Massachusetts Wetlands Protection Act

a. Background

The proposed project involves the reconstruction of Route 57 in Agawam and Southwick on a new alignment extending from South Westfield Street, northwesterly for approximately 2.2 miles to existing Route 57 near the Agawam/Southwick Town Line at Provin Mountain. Relocated Route 57 is to be constructed as a four lane limited access divided highway roughly paralleling existing Route 57 between South Westfield and South West Streets. Near South West Street, it transitions to an undivided rural highway, with one travel lane in each direction and a westbound truck climbing lane.

The proposed project "alters" wetland "resource areas" and thus requires issuance of an Order of Conditions pursuant to requirements of the Massachusetts Wetlands Protection Act (MGL Ch. 131 s. 40), cited as "the Act".

b. Relief under Section 10.55

Section 10.55 of the Massachusetts Department of Environmental Protection (DEP) Regulations (310 CMR 10.00-10.99) implementing "the Act" allow the issuing authority to issue an Order of Conditions permitting work which results in the loss of up to five thousand (5,000) square feet of Bordering Vegetated Wetland when said areas are replaced in accordance with the following general conditions and any additional specific conditions the issuing authority deems necessary to ensure that the replacement area functions in a manner similar to the area lost:

(1) the surface of the replacement area to be created ("the replacement area") shall be equal to that of the area that will be lost ("the lost area") ;

(2) the ground water and surface elevation of the replacement area shall be approximately equal to that of the lost area;

(3) The overall horizontal configuration and location of the replacement area with respect to the bank shall be similar to that of the lost area;

(4) the replacement area shall have an unrestricted hydraulic connection to the same water body or waterway associated with the lost area;

(5) the replacement area shall be located within the same general area of the water body or reach of the waterway as the lost area;

(6) at least 75 percent of the surface area of the replacement area shall be reestablished with indigenous wetland plant species within two growing seasons and prior to said vegetative reestablishment any exposed soil in the replacement area shall be temporarily stabilized to prevent erosion in accordance with standard U.S. Conservation Service methods; and

(7) The replacement area shall be provided in a manner which is consistent with all other General Performance Standards for each resource area in Part III of 310 CMR 10.00.

The proposed project does not conform to the provisions of Section 10.55(4) in that 1) the total area of wetland to be altered exceeds the permitted maximum and 2) the replicated wetlands do not conform to all requirements of 10.55(4)(1) through (7). Thus, prior to issuance of any Order of Conditions, a variance must be issued by the Massachusetts Department of Environmental Protection (DEP).

In accordance with the provisions of Section 10.58, relief is needed from the requirements of Section 10.55 since the area of bordering vegetated wetland/land under water to be filled under all current Alternatives exceeds the maximum threshold of 5,000 sq.ft. Specifically, Alternatives III and III(a) require filling 6.6 to 6.4 acres of bordering vegetated wetland/land under water respectively. Alternatives IV and IV(a) require filling approximately 7.7 to 7.3 acres respectively.

Because the replacement wetlands are consolidated and constructed in common centralized locations, a variance is required with respect to several aspects of 10.55(4), including the following:

(a) With respect to subsection (2), "the ground water and surface elevation of the replacement area" are typically not "approximately equal to that of the lost area"

(b) With respect to subsection (3), "the overall horizontal configuration and location of the replacement area with respect to the bank" are typically not "similar to that of the lost area"

(c) With respect to subsection (4), the replacement wetlands will have unrestricted hydraulic connections to the nearest water body, however, the hydraulic connections are typically not made to "the same water body or waterway associated with the lost area"

(d) With respect to subsection (5), the replacement wetlands are typically not "located within the same general area of the water body or reach of the waterway as the lost area".

It is anticipated that replacement wetlands could be constructed in a manner that would generally conform to the requirements of subsections (2), (3), (4), and (5). This is not proposed because creation of large consolidated wetland areas is considered preferable from a resource enhancement perspective. The consolidated wetlands provide better habitat value and have a greater chance of success. Thus, they better protect the "interests of the Act" than literal enforcement of the regulations. Replacing lost wetlands in kind, in close proximity to each wetland area lost, would result in small, fragmented areas of wetland that would have little habitat value and would be difficult to monitor and maintain.

c. Additional Relief under Sections 10.54, 10.56 and 10.57

The proposed project alters Banks, Land Under Water, and Land Subject to Flooding above thresholds specified in Section 10.54(4)(a)(5), Section 10.56(4)(a)(4), and Section 10.57(4)(a)(3). The alteration of more than 50 linear feet of bank, more than 5,000 sq.ft. of Land Under Water, or more than 5,000 sq.ft. of Land Subject to Flooding is permitted only upon determination that the alterations have no adverse effects on wildlife.

Should DEP determine that said alterations will have an adverse effect on wildlife, relief from the provisions of the respective Sections of the Regulations would be required.

To the extent that wildlife habitat must be replicated, it is to be replicated off site in Wetland Areas A, B, C, D, E, and F. Because the replacement wetlands are constructed in common centralized locations, a variance is needed with respect to several aspects of 10.60(3). including the following:

(1) With respect to subsection (b), "the elevation of ground water relative to the surface of the replacement area" is typically not "approximately equal to that of the lost area"; and

(2) With respect to subsection (c), the replacement of Banks and Land Under Water is typically not "located on the same water body or waterway"; the replacement of bordering land subject to flooding is typically not "located approximately the same distance from the water body or waterway as the lost area"; and the replacement of vernal pool habitat is typically not "located in close proximity to the lost area".

It is anticipated, that wildlife habitat could be replicated consistent with the provisions of 10.60(3). Creation of consolidated wetland areas is considered preferable from a resource enhancement perspective and thus better protects the "interests of the Act" than strict enforcement of the regulations.

d. Procedure

The Commissioner of the Department of Environmental Protection may waive any part of the DEP Regulations following an adjudicatory hearing if he/she finds as follows:

(1) there are no reasonable conditions or alternatives that would allow the project to proceed in compliance with the regulation(s);

(2) that mitigating measures are proposed that will allow the project to be conditioned so as to contribute to the protection of the interests identified in the Act; and

(3) that the variance is necessary to accommodate an overriding community, regional, state, or national public interest; or that it is necessary to avoid an Order that so restricts the use of property as to constitute an unconstitutional taking without compensation.

Because the proposed project impacts wetland resources in two communities, the request for variance will be made directly to the Commissioner.

e. Alternatives Explored

The Route 57 corridor extends for over two miles in length and lies in an east-west orientation. The corridor is repeatedly divided throughout its length by wetland systems which lie in a north-south orientation. Many of these north-south wetland systems extend for the full width of the corridor.

Relocated Route 57 is a major arterial highway having a right-of-way width of 300 feet. Although the Route 57 corridor has been under study for over twenty years, no practicable alternative has ever been identified which involves filling less than 5,000 sq.ft. of bordering vegetated wetland. As fills in excess of 5,000 sq.ft. are not "in conformance" with regulatory thresholds, no alternative has yet been identified which fully satisfies the procedural requirement of Section 10.58, that the variance request include "a description of alternatives explored that would allow the project to proceed in compliance with the regulation(s)" (underline added).

The alternatives explored, in addition to Alternatives III/III(a) and IV/IV(a), are indicated in Figures II-4, II-5, and II-6. A description of these alternatives and an explanation of why each is unreasonable is set forth below.

Alternative II

Alternative II involves the reconstruction of a 2.2 mile segment of Route 57 on a new alignment as a four lane limited access divided highway from South Westfield Street to South West Street and as an undivided rural highway west of South West Street. Alternative II was the subject of the 1979 EA/Negative Declaration and was once selected for construction.

This Alternative necessitates filling a total of 12.7 acres of bordering vegetated wetland. Wetland Nos. 1, 2, 3, 8, 9, 10, 11, 12, and 13 are impacted.

Because the total required wetland fill exceeds 5,000 sq.ft., this Alternative is not "in compliance with the regulations".

Alternative II is not considered to be reasonable.

Construction of Alternative II requires filling 4.1 acres of Wetland Area No. 8 which is contiguous to Leonard Pond, effectively bisecting what is now a contiguous wetland and open space area. Although Alternative II is desirable from a vehicular operations point of view, it causes disproportionate adverse effects on wetlands and wildlife and has been dismissed.

Full Relocation Alternatives

In the early 1970s, the Massachusetts Highway Department considered relocating Route 57 as a limited access divided highway extending from Suffield Street in Agawam to Hillside Road in Southwick. As indicated in Figure II-6, six of these Full Relocation Alternatives (Lines B, C, D, E, F, G, and W) were developed. Except for Line C, all were rejected due to adverse community and environmental impacts. Impacts on wetlands for the portion of their alignments in Agawam are comparable to or more adverse than the impacts of Alternative II. The portion of Line C in Agawam, was later refined and serves as the basis for Alternative II.

Because the total required wetland fill exceeds 5,000 sq.ft., none of the Full Relocation Alternatives are "in compliance with the regulations".

The Full Relocation Alternatives are not considered to be reasonable.

In comparison to the current Build Alternatives, the Full Relocation Alternatives cause greater adverse impacts on the communities and on the natural environment, including adverse effects on wetlands.

Upgrade Existing Route 57

This Alternative involves substantial construction both on new alignment and within existing roadway rights-of-way. The westbound highway off ramp provided under Phase I is reconstructed and South Westfield Street is widened to provide 4 lanes north of and 5 lanes south of Shoemaker Lane. Southwick Street (Existing Route 57) is widened to four lanes and left turns are restricted between South Westfield Street and South West Street. West of South West Street, Southwick Street is reconstructed as a two lane roadway with a westbound truck climbing lane.

This Alternative requires filling approximately 1.37 acres of wetland. Reconstruction of the ramps approaching South Westfield Street require filling 1.09 acres of Wetland Area No. 15. Widening for a westbound truck climbing lane necessitates filling 0.09 acres of Wetland No. 9, 0.08 acres of Wetland No. 12, and 0.11 acres of Wetland No. 13.

Because the total required wetland fill exceeds 5,000 sq.ft., this Alternative is not "in compliance with the regulations".

The Upgrade Existing Alternative is not considered to be reasonable.

This Alternative is not comparable to the other build alternatives which relocate Route 57 onto a new right-of-way in terms of safety, vehicular operations, and control of access. Due to the many existing properties along South Westfield and Southwick Streets, limitations on access are not practicable and traffic flow is disrupted by turns at driveways. Local and through traffic continues to be mixed on a single roadway. Widening South Westfield and Southwick Streets transforms these roadways into highway scale facilities. All of their remaining rural character is destroyed. This segments the community and affects the residential quality of contiguous neighborhoods.

Because work is required within existing traveled ways, there is substantial disruption of vehicular and pedestrian traffic during construction. Already serious capacity deficiencies deteriorate further during the construction period and motorists experience increased delays. Detours and disruption of traffic during construction cause secondary noise and traffic impacts on local roadway by-passes.

The Upgrade Existing Route 57 Alternative necessitates relocating 9 businesses and 11 dwelling units. A 7 foot wide strip of land must be acquired from all properties fronting on Southwick Street east of South West Street. A 7 to 11 feet wide strip must be acquired from all properties fronting on South Westfield Street. Left turn restrictions adversely affect commercial properties. The roadway reconstruction requires excavation of a 20 to 25 foot wide strip along the front of an ancient cemetery fronting on Southwick Street. The number of graves which may have to be relocated has not been determined, however, this disturbance is expected to be of special concern to the Town.

Although there are no properties on the National Register of Historic Places directly impacted by this Alternative, the three residences to be demolished at the intersection of Southwick and South West Streets are of concern to the Agawam Historical Commission. Their demolition results in an irreversible loss of cultural resources.

The Upgrade Existing Route 57 Alternative causes greater noise and fugitive dust impacts during construction and greater noise impacts in the long term, than the alternatives which relocate Route 57 onto a new alignment.

Alternative V

This Alternative also involves the relocation of Route 57 between South Westfield Street and the Agawam/Southwick Town Line. The ramp approaching South Westfield constructed during Phase I is modified and the 3200 foot segment of South Westfield Street between Relocated Route 57 and Shoemaker Lane is reconstructed as a four lane divided roadway. Relocated Route 57 extends west from the Shoemaker Lane as a four lane limited access highway to South West Street, where it transitions to a two way highway

This Alternative requires filling a total of 5.97 acres of wetland. Reconstruction of the ramps approaching South Westfield Street involves filling 1.09 acres of Wetland No. 15. The Alternative requires filling approximately 0.93 acres of Wetland No. 3, 0.44 acres of Wetland No. 16, 1.50 acres of Wetland No. 17, and 1.09 acres of Wetland No. 18. Widening for the westbound truck climbing lane involves filling 0.24 acres of Wetland No. 9, 0.13 acres of Wetland No. 12, 0.48 acres of Wetland No. 13, and 0.07 acres of Wetland No. 14.

Because the total required wetland fill exceeds 5,000 sq.ft., this Alternative is not "in compliance with the regulations".

Alternative V is not considered to be reasonable.

This Alternative is not comparable in terms of vehicular operations, safety, and convenience to Alternatives III, III(a), IV, and IV(a) which relocate Route 57 onto a new right-of-way with full control of access. Safety and operational problems arise from using a short segment of South Westfield Street to link two segments of higher speed, limited access highway. These safety problems are caused by the variable differential speeds and vehicle conflicts resulting from mixing local and through traffic.

Construction of Alternative V causes greater relocation impacts than any of the other build alternatives. It requires the relocation of 3 businesses, a church, and 86 dwelling units, of which 77 are within Pheasant Hill Village, which is "Section 8" subsidized housing for the elderly and low and moderate income families. This excessive relocation disrupts community cohesiveness. Relocation of the elderly and low and moderate income families presents particular hardships. Alternative V also encroaches on a portion of an ancient cemetery on South Westfield Street. Whether any graves have to be relocated has not been determined, however, any impacts on this cemetery are expected to be of special concern to residents.

Due to the proximity of residences, Alternative V causes greater construction and long term noise impacts than Alternatives III, III(a), IV or IV(a).

Alternative V(a)

This Alternative also involves the relocation of Route 57 between South Westfield Street and the Agawam/Southwick Town Line. The ramp reconstruction and the to South Westfield Street improvements are comparable to those provided under Alternative V. It extends west from Shoemaker Lane to South West Street as a two lane two way roadway with no control of access and it incorporates an existing street in Pheasant Hill Village as a segment of the highway.

This Alternative requires filling a total of approximately 3.04 acres of wetland. Reconstruction of the ramps at South Westfield Street requires filling 1.09 acres of Wetland Area No. 15. Approximately 0.20 acres of Wetland No. 3; 0.18 acres of Wetland No. 16; and 0.65 acres of Wetland No. 17 are also filled. Widening to provide a westbound truck climbing lane necessitates filling 0.24 acres of Wetland No. 9; 0.13 acres of Wetland No. 12; 0.48 acres of Wetland No. 13; and 0.07 acres of Wetland No. 14.

Because the total required wetland fill exceeds 5,000 sq.ft., this Alternative is not "in compliance with the regulations".

Alternative V(a) is not considered to be reasonable.

One segment of Alternative V(a) utilizes an existing road through "Pheasant Hill Village", which is a 200 unit Massachusetts Housing Finance Agency (MHFA) subsidized development containing housing for the elderly, the handicapped, and low and moderate income families. Pheasant Hill Village contains about 50 percent of the subsidized affordable housing units in the Town of Agawam. Pheasant Hill Village is a quiet cohesive residential community that Agawam regards as a notable step in attaining its policy of providing an adequate supply of affordable housing. Conversion of a quiet residential street to a primary regional arterial highway causes significant adverse impacts on vehicular safety, particularly with respect to the children, the elderly, and handicapped residents. Residential quality is degraded by disruption, noise, traffic, and dust during construction.

This Alternative is substantially inferior to Alternatives III, III(a), IV, and IV(a) in terms of vehicular operations, travel time, safety, and convenience. Unlike all other alternatives, Alternative V(a) is restricted to one travel lane in each direction, which results in significant capacity deficiencies and delays. When the facility is completed, it will already be at capacity during both peak hours. Increases in traffic volumes between 1993 and 2013 cause the capacity of the roadway to be exceeded, accompanied by excessive congestion, unacceptable delays, and lines of queued vehicles.

Lines of idling vehicles emit a higher level of carbon monoxide than vehicles which experience better operating conditions. Therefore the Alternative's substandard vehicular operations contribute to air pollution, particularly to short term carbon monoxide (CO) concentrations.

Unlike Alternatives III, IV, and V, there are no controls on access along the right of way for Alternative V(a). Therefore development is stimulated along its entire frontage. Abutting landowners could subdivide their property into building lots without incurring the cost of constructing subdivision roadways. Therefore the land along the corridor is expected to be rapidly developed. This rapid development adversely affects the Town and increase demand on schools and other municipal services.

This induced development also increases sedimentation and erosion during construction and increases stormwater runoff on a permanent basis. This stormwater contains contaminants typical of residential sites. These changes in hydrology and contaminant loadings could adversely affect water and wetland resources. Many of these residences may have septic systems which contribute effluent to groundwater.

Construction of the Alternative V(a) requires relocating 1 business, 14 dwelling units, and a church. The roadway's slopes encroach on a triangular shaped portion of an ancient cemetery on South Westfield Street. Whether any graves would have to be relocated has not been determined, however, any impacts on this cemetery are expected to be of special concern to local residents.

Due to the proximity of residences, Alternative V(a) causes greater construction and long term noise impacts than Alternatives III, III(a), IV or IV(a).

Finding With Respect to Alternatives

Numerous diverse alternatives have been systematically developed and evaluated for a period extending for over 20 years. No alternative has ever been identified which requires filling of less than 5,000 sq.ft. of wetland. Thus with respect to the regulatory threshold of 5,000 sq.ft. of bordering vegetated wetland loss, it can be concluded that sufficient evidence exists to enable the DEP Commissioner to make the requisite finding that "there are no reasonable conditions or alternatives that would allow the project to proceed in compliance with the regulation(s)". The MHD believes that Alternatives III/III(a) and IV/IV(a) have the least impact of the possible alternatives.

f. Mitigating Measures

Mitigating measures are proposed to contribute to the protection of the interests identified in "the Act" as set forth below. These mitigating measures include provisions to be implemented both during construction and in the long term. Water bodies, waterways, floodplains, wetlands, and wildlife are functionally interrelated and measures to mitigate impacts on any one element, serve to protect additional "interests of the Act", as well.

Soil Erosion and Sedimentation

MHD design standards require inclusion of measures to control erosion and sedimentation during construction. Required measures include the following:

- placing loam and seed or mulch on slopes.
- constructing sedimentation and detention basins.
- providing diversion channels, hay bales, and siltation fencing.
- reseeding with quick rooting grasses.

In addition to the above general requirements to mitigate adverse impacts on water quality and wetlands, MHD proposes the following:

- placing slopes no steeper than 2 to 1.

- placing diversion channels on cut slopes to divert sediments during construction and leaving these channels in place to collect and treat stormwater runoff from the finished roadway surface.

- constructing cut slopes over 30 feet high with flat bench areas to limit erosion of the slope face.

Water Quality

To mitigate the adverse impacts on water quality, MHD proposes the following:

- Applying deicing chemicals in accord with recommended practices.
- Limiting fertilizer use except to ensure establishment during the first growing season.
- Locating stormwater discharges in areas that are well flushed to encourage dilution of road salt and other contaminants.
- Providing oil and grease separators at detention basins.
- Providing sumps and down turned elbows in catchbasins to trap petroleum products and sediments.

Floodplain Management

To mitigate the adverse effects of increased flooding, MHD proposes the following:

- providing stormwater detention basins to attenuate increases in the peak rate of stormwater discharge.
- sizing cross culverts to pass the design storm without ponding outside the right-of-way.
- providing compensatory flood storage in replacement wetland areas.

Replacement Wetlands

To mitigate adverse impacts on "Resource Areas" including Banks, Bordering Vegetated Wetlands (BVW), Land Under Water (LUW), and Bordering Land Subject to Flooding (LSF) as well as on wildlife, MHD proposes to construct the replacement wetland areas indicated in Table V-5. Wetland Areas A, B, C, and F contain a total of area of 12.0 acres They are proposed to help mitigate the loss of 6.6 and 6.4 acres of BVW and LUW under Alternatives III and III(a) respectively. Wetland Areas A, D, E, and F contain a total of area of 11.2 acres and are proposed to help mitigate the loss of 7.7 and 7.3 acres of BVW and LUW under Alternatives IV and IV(a) respectively.

TABLE V-5
SUMMARY OF RESOURCE AREAS IMPACTED
AND REPLACEMENT AREAS PROPOSED

	RESOURCE AREA IMPACTED		REPLACEMENT AREA PROPOSED
	ALT III	ALT III(a)	ALTS III & III(a)
BVW AND LUW (Ac.)	6.62	6.37	12.0
LSF (Ac.)	0.89	0.89	*
Bank (ln. ft.)	1,520	1,520	2,350
	ALT IV	ALT IV(a)	ALTS IV & IV(a)
BVW AND LUW (Ac.)	7.74	7.29	11.2
LSF (Ac.)	1.47	1.47	*
Bank (ln. ft.)	1,610	1,610	3,590

* Portions of these replicated areas provide replacement flood storage

Design plans for replacement wetlands showing surface elevations, surface and groundwater controls, construction requirements, and plant materials are developed during the 25% design phase. Earthwork is to be performed during the summer, fall, and winter seasons and replanting is to be performed during the spring and fall.

The proposed wetland replacement areas are described as follows:

Area A encompasses approximately 5.8 acres and is to be replanted with indigenous shrubs and saplings, including red maple, arrowwood viburnum, dogwoods, and highbush blueberry. Plantings are placed to achieve 75 percent coverage within two years. A meandering channel is provided within this area which replicates Land Under Water and Bank.

Area B encompasses approximately 0.5 acres and is hydraulically connected to Wetland Areas No. 5 and 6. Replanting consists of indigenous shrubs, trees and saplings.

Area C contains approximately 4.5 acres and replaces Bordering Vegetated Wetland, Land Under Water, and Bank. The existing irrigation pond is expanded and the pond and its banks planted with species having high wildlife value. In addition, this area replaces lost flood storage.

Area D contains approximately 3.2 acres and replaces lost Bordering Vegetated Wetland. Replacement planting include shrubs and saplings indigenous to the area such as dogwoods, willows, and red maples. Bank and Land Under Water is replicated through construction of a channel which carries and retains stormwater to ensure maintenance of a viable hydrologic regime. The area is subject to flooding and replaces lost flood storage.

Area E contains approximately 1.0 acres and provides replicated Bordering Vegetated Wetland as well as Land Under Water and Bank which provide food and shelter for water fowl during migratory and overwintering periods. This area enhances adjacent Wetland Area No. 4 by enlarging its total area and increasing habitat diversity by adding a water body and wet meadow.

Area F encompasses approximately 1.2 acres and provides replacement Bordering Vegetated Wetland. The existing culvert for Route 57 is removed and replaced with a channel providing Land Under Water and Bank.

Finding With Respect to Mitigating Measures

Numerous mitigating measures have already been developed and evaluated. During development of the 25% design plans and as part of the ongoing Phase II of the Corps of Engineers Highway Methodology, these mitigating measures are to be refined and supplemented as appropriate. The mitigating measures already identified are effective in alleviating adverse effects on Banks, Land Under Water, Bordering Vegetated Wetland, and Land Subject to Flooding. Thus with respect to the mitigating measures proposed by MHD, it can be concluded that sufficient evidence exists to enable the DEP Commissioner to make the requisite finding "that mitigating measures are proposed that will allow the project to be conditioned do as to contribute to the protection of the interests identified in the Act".

g. **Overriding Public Interest**

Project Need

Existing Route 57 (Southwick Street) has serious traffic safety and operational problems caused by numerous substandard roadway elements. Substandard elements include an excessive number of closely spaced curb cuts, narrow travel lanes, poor sight distance, lack of proper signalization, inadequate pedestrian protection, undefined shoulders and sidewalks, lack of a westbound truck climbing lane approaching Provin Mountain, variable speed zones, and conflicts between local and through traffic. The problems caused by these deficiencies are amplified by the heavy traffic volumes which are forced to use existing Southwick Street because of the lack of an alternative east/west arterial.

These substandard roadway elements are reflected in accident data. The previously upgraded limited access portion of Route 57 east of Mill Street experienced only 15 accidents, while the unimproved portion experienced 138 accidents. Of these 138 accidents, 23 occurred on the segment of Southwick Street (Route 57) between South Westfield Street and the Southwick town line. Ten of these accidents involved personal injuries. The 23 accidents constitute 369 accidents per One Hundred Million Vehicle Miles (100 MVM) which is 138 percent of the statewide average for primary two lane urban roadways. The 10 personal injury accidents constitute 160 accidents per 100 MVM which is 160 percent of the statewide for primary two lane urban roadways.

Currently, Southwick Street west of South Westfield Street carries approximately 13,700 vehicles per day. This will increase to 20,810 vehicles per day by 2013, a 52 percent increase. Thus existing congestions and delays will worsen over time.

The intersection of Southwick and South Westfield Streets presently operates at Level of Service F. Improvements to the this intersection are to be provided as part of a separate project and its Level of Service improves temporarily to D. By the year 2013, growth in traffic volumes causes the operation of the intersection to again deteriorate to Level of Service F.

Proposed Improvements

The purpose of the proposed project "*...is to resolve long standing safety and capacity deficiencies, in traffic operations and access, on existing Route 57 in Agawam, Massachusetts and to provide increased traffic capacity while moving traffic along an east-west corridor.*"[1]

Relocated Route 57 accommodates future traffic safely and efficiently, providing good Levels-of-Service both at intersections and on the intervening highway segments. Relocating Route 57 causes through traffic to be diverted to the new roadway. The future 24 hour traffic volume on Southwick Street, between South Westfield Street (Route 187) and South West Street, decreases from 13,700 vehicles per day to 5,310 vehicles per day in 1993 (a 61 percent decrease) and to 7,060 vehicles per day in 2013 (a 49 percent decrease). Diversion of traffic to the new roadway minimizes conflicts between local and through traffic. The decrease in the total traffic volume on Existing Route 57 alleviates the long standing safety deficiencies and reduces accident potential. The existing roadway is able to accommodate these reduced traffic volumes while providing good Levels-of-Service. Traffic operations for the year 2013 at the key intersection Southwick and South Westfield Streets of is upgraded form Level of Service F to B.

[1] William F. Lawless, P.E., October 3, 1990, op.cit.

The existing capacity deficiencies cause motorists to use local streets to bypass Southwick Street. Under the No Build Condition, increases in background traffic cause more and more motorists to seek alternative routes through local streets. The Proposed Project reduces congestion on Southwick Street and other residential streets, thereby alleviating the adverse effects of bypass traffic on safety and residential quality of local streets.

Finding With Respect to Overriding Public Interest

There is an overriding public interest in resolving the long standing safety and capacity deficiencies, in traffic operations and access, on existing Route 57. Relocating Route 57 on a new alignment with control of access both accommodates through traffic safely and efficiently on the new highway while alleviating congestion and accident potential on existing Route 57. Based upon over twenty years of systematic study, no alternative has ever been identified which allows Route 57 to be relocated while filling less than 5,000 sq.ft. of bordering vegetated wetland. Thus with respect to establishment of an overriding public need, it can be concluded that sufficient evidence exists to enable the DEP Commissioner to make the requisite finding "*that the variance is necessary to accommodate an overriding community regional, state, or national public interest...*"

E. WILDLIFE

Construction of the proposed project will affect the upland wildlife communities in several ways. Effects on upland wildlife communities will be related to the size of contiguous open space and quality habitat disturbed. Loss of habitat and some destruction of wildlife will be unavoidable throughout construction.

Long term effects will result from the bisecting of a now continuous area. Population sizes of some groups of animals may be altered due to the limiting of home ranges and interruption of daily migration routes. Several miles of field edge community may result from the proposed construction. Edge communities support a wide diversity of wildlife, potentially species not indigenous to the area. In addition, this may bring a higher density of wildlife closer to the highway which could lead to a higher frequency of animal related accidents.

Alternatives III and III(a) will impact upland environments, such as cultivated field areas of the Tuckahoe Turf Farm and the Boglisch Tree Farm. These areas, because they are cultivated and periodically maintained, do not contribute a significant amount of food and cover for wildlife species.

Alternatives IV and IV(a) would have a lesser impact on upland wildlife than Alternatives III and III(a). Although a greater percentage of upland areas are to be utilized under this Alternative alignment, these areas are closer to areas of existing development, e.g. existing Route 57, proposed and existing housing developments, and consist mostly of cultivated fields. These areas typically support fewer numbers of species and individuals than high quality upland environments.

F. LAND USE AND SOCIOECONOMIC

1. Land Use and Development

The proposed project will cause primary impacts on land use within the project area as existing land uses and developable parcels are acquired for highway purposes. As indicated in Section M, the proposed project is not expected to cause any measurable secondary land use or population impacts on an area wide or intercommunity basis.

Predominant land uses along Alternatives III and III(a) and Alternatives IV and IV(a) include residential and agricultural uses. Under the No Build Alternative, it is anticipated that land within the project area will continue to be subdivided and developed. Agricultural and undeveloped areas, including the open land in the vicinity of Leonard Pond, will transition to residential use in accordance with applicable municipal zoning and land subdivision requirements.

Implementation of the Route 57 Relocation Project will impact land use within the highway corridor directly by acquiring land for highway and related purposes and creating remnant parcels.

TABLE V-6
ROUTE 57 RELOCATION PROJECT
SUMMARY OF PRIMARY LAND USE IMPACTS
(ACRES)

	ALTERNATIVES			
	III	III(a)	IV	IV(a)
EXISTING LAND USE				
Residential	13.3	24 4	20.2	27 1
Farmland [1] [2]	115.8	115.8	92.8	92.8
Undeveloped	0.5	0.5	4.5	4.5
Town Roads and Other	1.9	1.9	1.2	1.2
TOTAL [2]	131.5	142.6	118.7	125.6
BUILD CONDITION LAND USE				
Incorporated in Right-of-Way	77.2	77.2	79.9	79.9
Wetland Replication Areas [3]	29.6	29.6	20.4	20.4
Remnant Parcels [2] [3]	24.7	35.8	18.4	25.3
TOTAL [2]	131.5	142.6	118.7	125.6

[1] Including non farmable portions.
[2] Will increase if Replacement Wetland Area A is located south of the highway.
[3] Area beyond normal highway right-of-way.

Under Alternatives III/III(a) and IV/IV(a), 77.2 to 79.9 acres of land will be acquired and incorporated into the highway right-of-way. An additional 20.4 to 29.6 acres will be acquired for the purpose of creating replacement wetland areas. Restrictions will be placed on these areas to ensure that these areas remain permanently as wetlands.

Table V-6 is based upon locating Replacement Wetland Area A north of the respective Build Alternative as indicated in Figure VI-1. Consideration is being given to locating Replacement Wetland Area A south of the Proposed Build Alternative. The parcel accommodating this replacement wetland would encompass about 15 acres. In this instance, the area of farmland and the total area of land impacted would increase. The parcel containing the current Wetland Area A would be added to the Remnant Parcel category.

Portions of parcels remaining after required highway takings are designated as remnants. Where feasible, remnant parcels from the Tuckahoe Turf Farm and the Boglisch Nursery are utilized for wetland replication areas. Some parcel remnants are isolated backland and may remain undeveloped for extended periods. Others may be purchased by abutters. Other remnants, particularly those having frontage on existing streets, may be developed in the near term.

These primary land use impacts are generally consistent with the goals and policies of the Town of Agawam and are not considered to be significant.

The Route 57 Relocation Project will decrease traffic volumes on existing Southwick Street and decrease travel times along its east-west corridor. The decrease in traffic on Southwick Street could potentially affect retail businesses that draw patrons from "pass by" traffic. This secondary impact is considered to be negligible because local traffic will remain and improved traffic flow will make these businesses more accessible. The decrease in travel time along the east-west corridor is estimated to be only about 2 1/2 minutes, which is not sufficient to alter existing area wide development trends. Acquisition of property for highway purposes will decrease tax revenues. In Agawam these losses will be offset by continued growth and in Southwick the loss will be very small. Accordingly, these adverse impacts are not considered to be significant. These indirect impacts are discussed in greater detail in Section M.

2. Open Space and Recreation Plan

The Metacomet-Monadnock Hiking Trail, which generally runs north- south, follows the shoulder of existing Route 57 for a short distance near Provin Mountain at the Agawam/Southwick Town Line. To ensure continuity of this portion of the Trail, proposed mitigation measures include a relocation of the Trail along reconstructed Southwick Street as required, as well as providing safety and directional signage for a hiker crossing of the new roadway so that the Trail's recreational use will be maintained. An expanded grassed walk area will be provided along the reconstructed portion of Southwick Street for the hikers. These measures were previously approved by members of the Berkshire Appalachian Mountain Club Trails Committee for Alternative II. Plans showing Alternatives III/III(a) and IV/IV(a) were forwarded to the Committee, and no comments were received.[1]

[1] Correspondence with Dr. Walter M. Banfield of the Berkshire Appalacian Mountain Club Trails Committee.

G. RELOCATION

The proposed right of way for each Build Alternative will consist of a 300 foot wide corridor from South Westfield Street to the Agawam Town Line.

The taking of land, including any existing dwellings or structures, is necessitated for highway construction with allowances for topography, mitigating buffers and wetland replication areas. Several parcels of land at the eastern portion of the proposed project near South Westfield Street have already been acquired by the State.

The number of properties affected by the proposed project are listed below for each Build Alternative.

TABLE V-7

RIGHT OF WAY IMPACTS

	Alternative			
	III	III(a)	IV	IV(a)
Number of Owners Affected	8	20	13	21
Residential Parcels Affected	5	17	10	18
Business Parcels Affected (Farms)	3	3	3	3

Alternative III would require the relocation of four (4) homes in Agawam and one (1) home in Southwick. This Alternative would also impact three (3) farms. The impacts on Farm Lands is evaluated in the following section of this Report.

Alternative IV would require the relocation of ten (10) homes in Agawam. Businesses (farms) impacted are the same as in Alternative III, however, the location of the takings vary.

Alternatives III(a) and IV(a) require raising the grade of South West Street and building an embankment for its approach to the proposed grade separation structure over Relocated Route 57. This requires the relocation of twelve (12) additional residences under Alternative III(a), and the relocation of eight (8) additional residences under Alternative IV(a).

Properties anticipated to require acquisition and relocation are indicated in Figures V-3 through V-8 and are summarized in Tables V-8 and V-9. Acquisition of undeveloped parcels, partial acquisition of land only from developed properties, acquisition of easement rights, and acquisition of land and accessory structures are not included. The listing of properties is based upon information currently available. The listing should be regarded as conceptual only and subject to revision. Prior to issuance of the Final SEIR, the 25% design plans will be substantially complete and this will provide the basis for a more precise estimate of acquisition and relocation.

TABLE V-8

ANTICIPATED RELOCATIONS
ALTERNATIVES III AND III(a)

RELOCATION REQUIRED FOR BOTH ALTERNATIVES III AND III(a)

Address	Assessors Parcel No.	Type	Present/Former Owner
188 S.West Street	C8-1-2	Residential	Nadia, Robert & Arthur King
202 S.West Street	C8-1-1	Residential	Dale T. & Sandra L. Boglisch
244 S.West Street	C7-1-4	Residential	Charles W. & Arlene A. Brown
662 Southwick St.	A8-1-1	Residential	Donald & Cynthia Parisian
Feeding Hills Road	- - -	Residential	Unknown
Boglisch Nursery	B8-1-1	Farm (Business)	Arthur P. Boglisch & Sons, Inc.
Schmaelzle	E6-1-7	Farm (Business)	Mary R. Schmaelzle
Schmaelzle	E7-1-2	Farm (Business)	Mary R. Schmaelzle
Tuckahoe Turf Farm	C7-2-4	Farm (Business)	Tuckahoe Turf Farm

ADDITIONAL RELOCATION REQUIRED FOR ALTERNATIVE III(a) Only

Address	Assessors Parcel No.	Type	Present/Former Owner
131 S.West Street	C8-2-12	Residential	Joseph H. & Susan R. Guay
141 S.West Street	C8-2-13	Residential	Joseph H. & Susan R. Guay
142 S.West Street	C8-1-5	Residential	Roger A. & Carol A. Slate
157 S.West Street	C8-2-14	Residential	Gerard S. & Carol A. Satkowski
165 S.West Street	C8-2-15	Residential	Gerald E. & Maureen E.Gendcon
170 S.West Street	C8-1-3	Residential	Caniel Carlisto & Vera Kozack Richards
173 S.West Street	C8-2-16	Residential	John C. & Mona Daponde, Jr.
187 S.West Street	C8-2-17	Residential	Frank & Marion L. Coupas
250 S.West Street	C7-1-3	Residential	Unknown
260 S.West Street	C7-1-2	Residential	Unknown
268 S.West Street	C7-1-1	Residential	Unknown
271 S.West Street	C7-2-1	Residential	Unknown

TABLE V-9

ANTICIPATED RELOCATIONS
ALTERNATIVES IV AND IV(a)

RELOCATION REQUIRED FOR BOTH ALTERNATIVES IV AND IV(a)

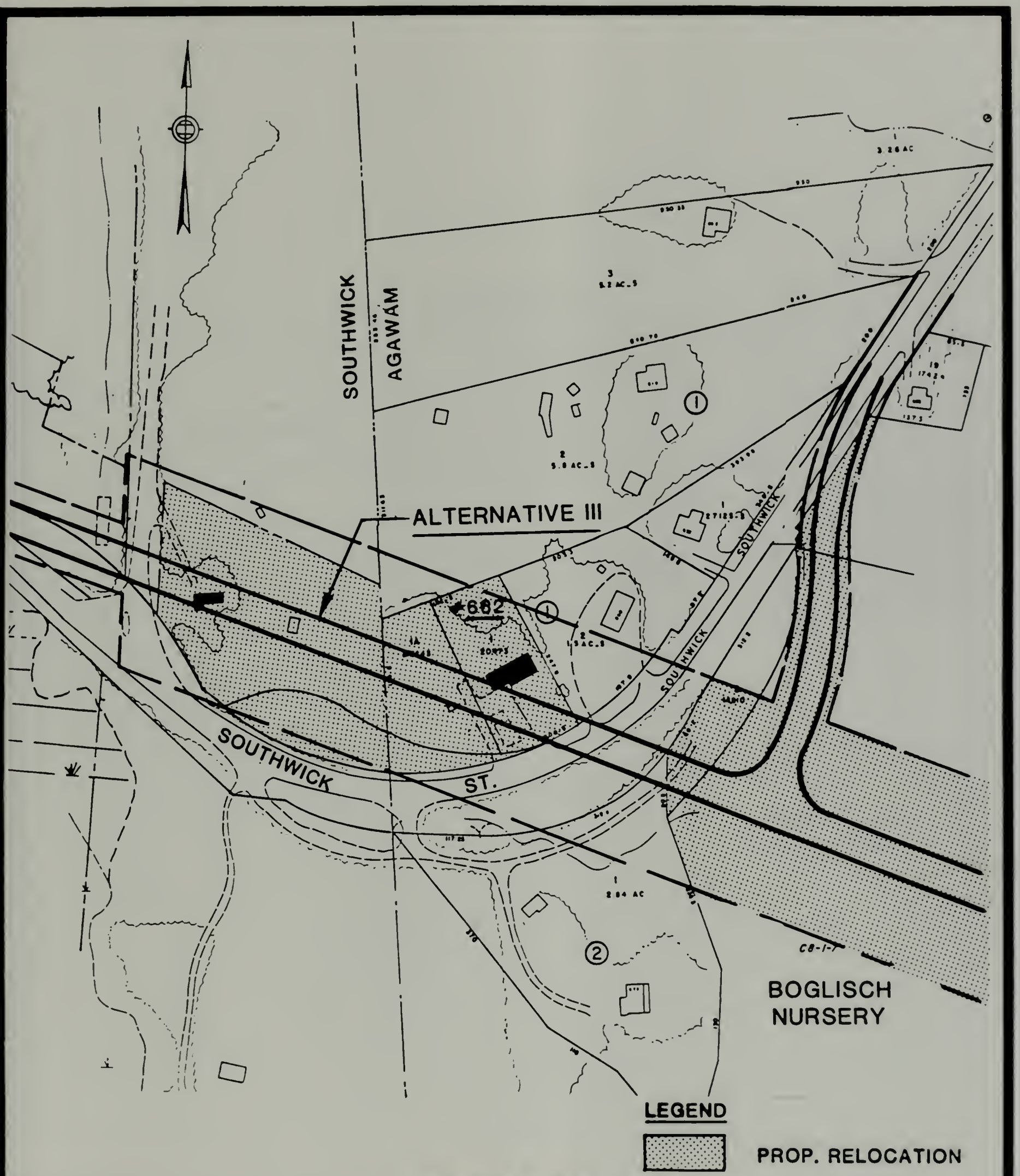
Address	Assessors Parcel No.	Type	Present/Former Owner
142 S.West Street	C8-1-5	Residential	Roger A. & Carol A. Slate
157 S.West Street	C8-2-14	Residential	Gerard S. & Carol A. Satkowski
165 S.West Street	C8-2-15	Residential	Gerald E. & Maureen E.Gendcon
170 S.West Street	C8-1-3	Residential	Caniel Carlisto & Vera Kozack Richards
173 S.West Street	C8-2-16	Residential	John C. & Mona Daponde, Jr.
187 S.West Street	C8-2-17	Residential	Frank & Marion L. Coupas
605 Southwick St.	B9-219	Residential	Marjorie B. Lang
610 Southwick St.	A9-1-2	Residential	George Harvey & Alice Marie Collins
632 Southwick St.	A9-1-1	Residential	Unknown
650 Southwick St.	A8-1-2	Residential	Andre M. & Patricia Bouchard
Boglisch Nursery	B8-1-1	Farm (Business)	Arthur P. Boglisch & Sons, Inc.
Schmaelzle	E6-1-7	Farm (Business)	Mary R. Schmaelzle
Schmaelzle	E7-1-2	Farm (Business)	Mary R. Schmaelzle
Tuckahoe Turf Farm	C7-2-4	Farm (Business)	Tuckahoe Turf Farms

ADDITIONAL RELOCATION REQUIRED FOR ALTERNATIVE IV(a) Only

Address	Assessors Parcel No.	Type	Present/Former Owner
115 S.West Street	C8-2-10	Residential	Carol A. Anderson & Robert Lareau
123 S.West Street	C8-2-11	Residential	Raymond C & Nancy E. Francis
131 S.West Street	C8-2-12	Residential	Joseph H. & Susan R. Guay
132 S.West Street	C8-1-10	Residential	Mary Delano
141 S.West Street	C8-2-13	Residential	Joseph H. & Susan R. Guay
188 S.West Street	C8-1-2	Residential	Nadia, Robert & Arthur King
202 S.West Street	C8-1-1	Residential	Dale T. & Sandra L. Boglisch
224 S.West Street	C7-1-4	Residential	Charles W. & Arlene A. Brown

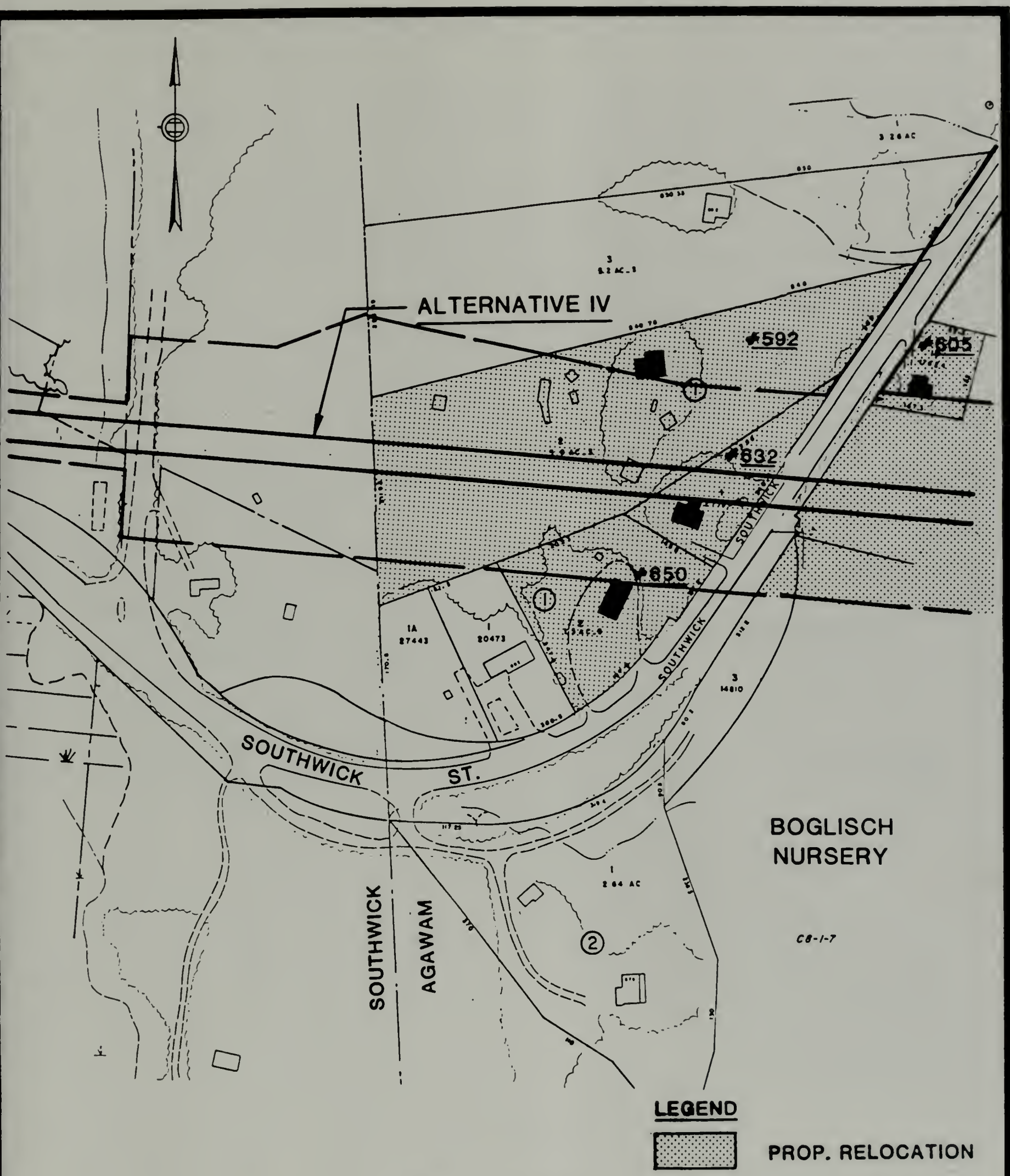
The housing market analysis previously set forth in Table IV-3 indicates that adequate housing resources are available to facilitate relocation of the residents that would be taken for any of the Build Alternatives. The adverse impacts of taking existing residential properties and the resulting relocations are not considered to be significant for the proposed project.

THIS PAGE INTENTIONALLY LEFT BLANK



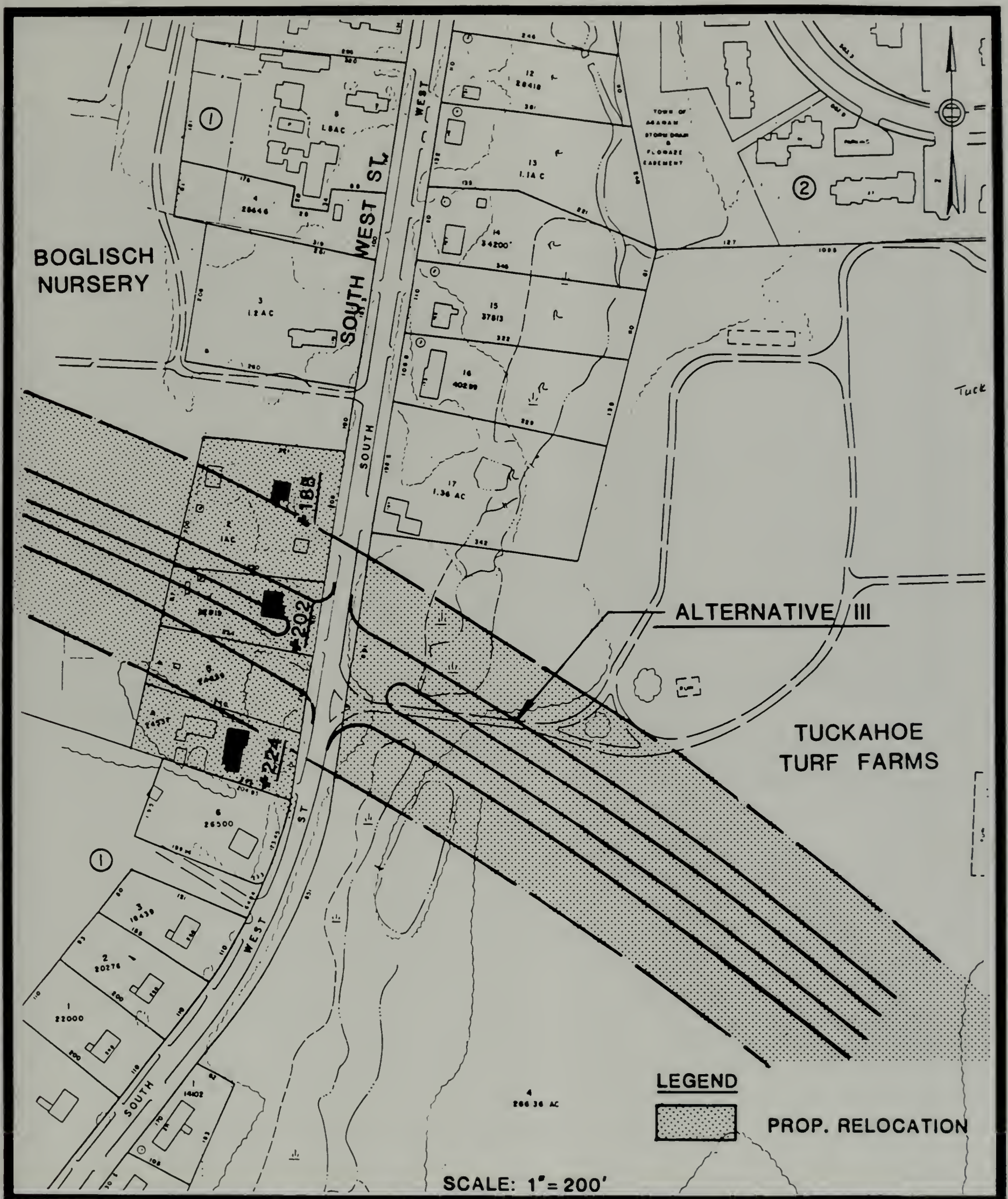
SCALE: 1" = 200'

ROUTE 57 RELOCATION AGAWAM AND SOUTHWICK MASSACHUSETTS	RELOCATION VICINITY SOUTHWICK TOWN LINE ALTERNATIVE III	V-3 FIGURE

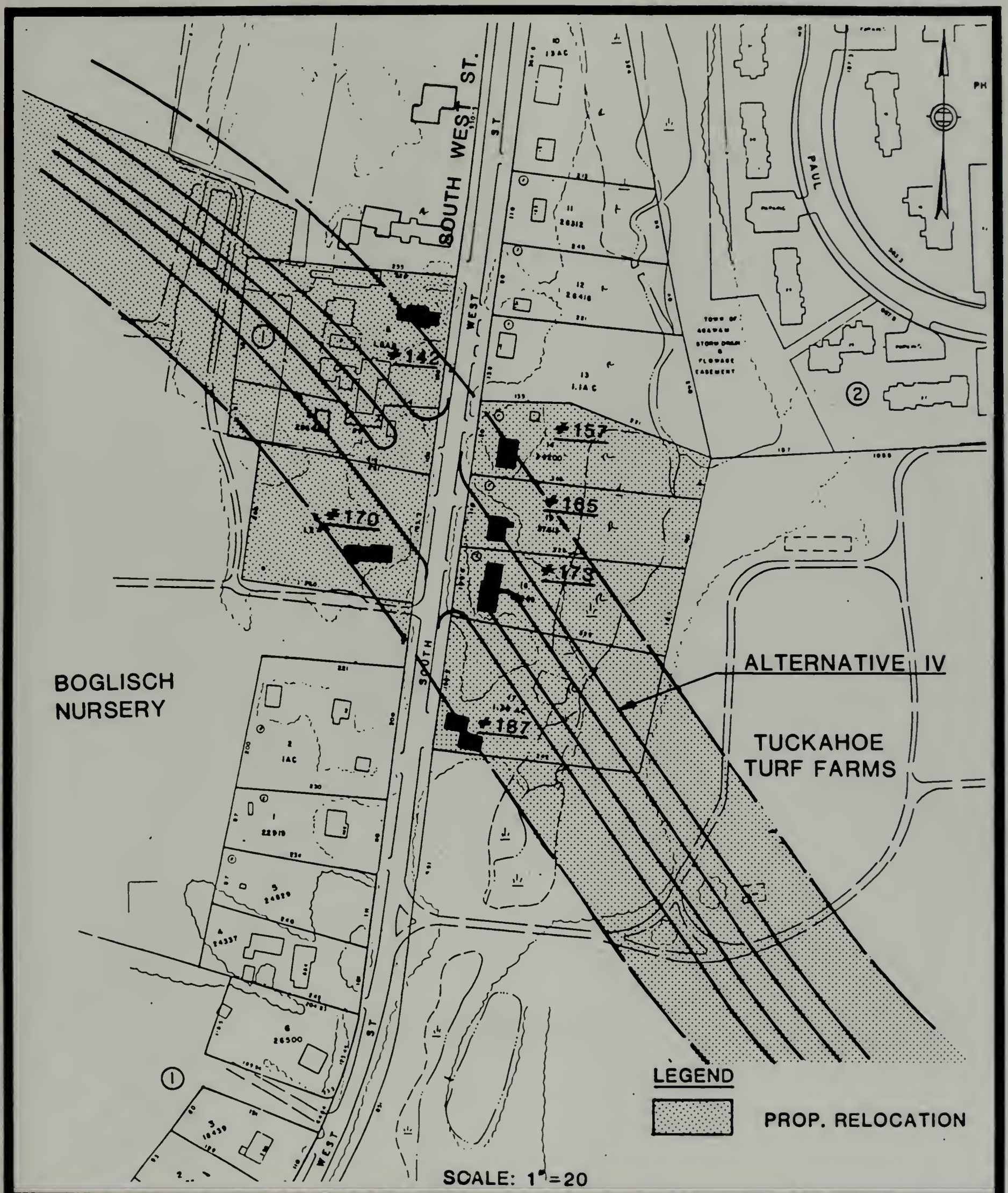


SCALE: 1"= 200'

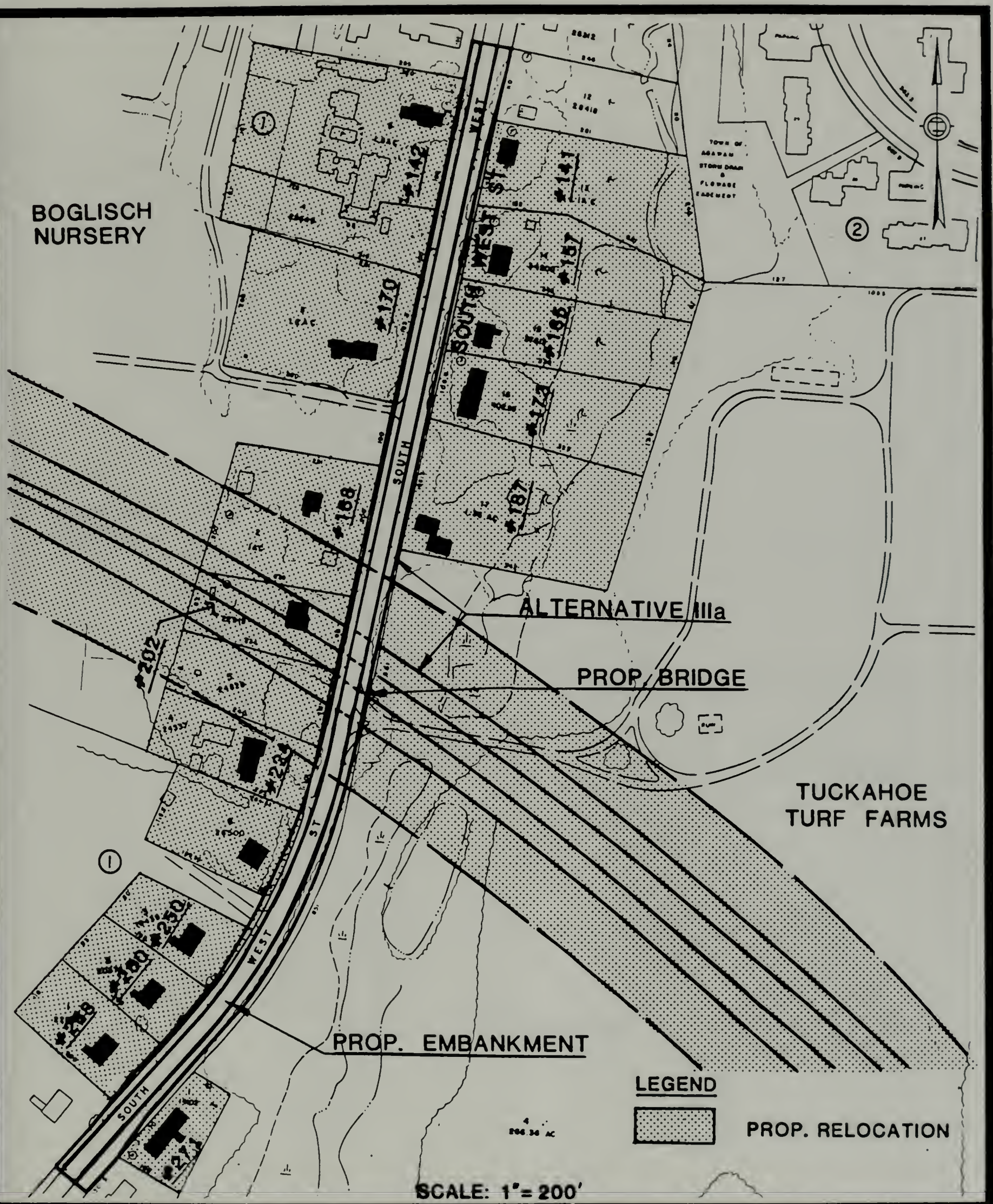
ROUTE 57 RELOCATION AGAWAM AND SOUTHWICK MASSACHUSETTS	RELOCATION VICINITY SOUTHWICK TOWN LINE ALTERNATIVE IV	V-4 FIGURE



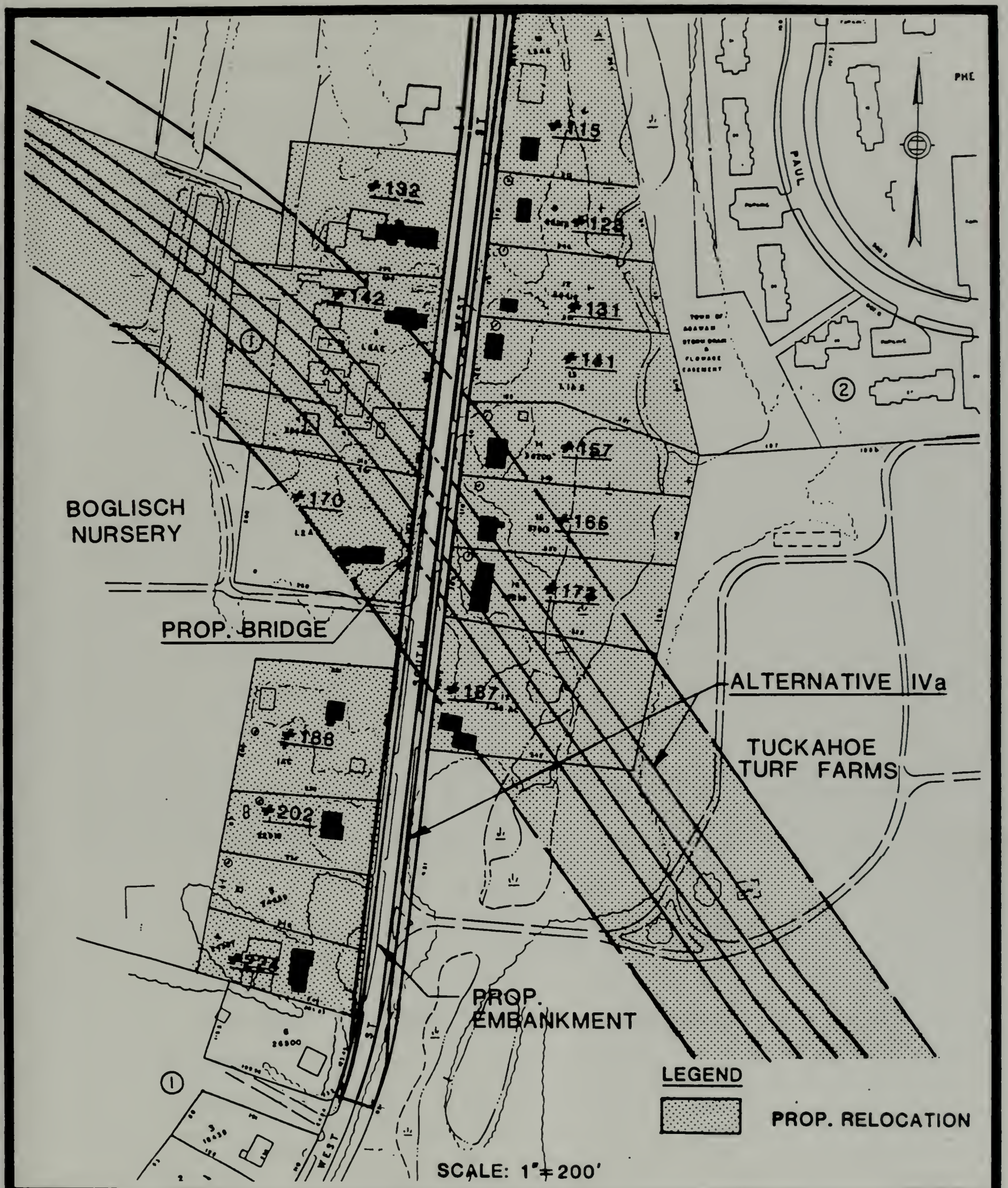
ROUTE 57 RELOCATION AGAWAM AND SOUTHWICK MASSACHUSETTS	RELOCATION VICINITY SOUTH WEST ST. ALTERNATIVE III	V-5 FIGURE



ROUTE 57 RELOCATION AGAWAM AND SOUTHWICK MASSACHUSETTS	RELOCATION VICINITY SOUTH WEST ST. ALTERNATIVE IV	V-6 FIGURE



ROUTE 57 RELOCATION AGAWAM AND SOUTHWICK MASSACHUSETTS	RELOCATION VICINITY SOUTH WEST ST. ALTERNATIVE IIIa	V-7 FIGURE



ROUTE 57 RELOCATION AGAWAM AND SOUTHWICK MASSACHUSETTS	RELOCATION VICINITY SOUTH WEST ST. ALTERNATIVE IVa	V-8 FIGURE

H. FARMLANDS

Construction of Alternative III, III(a), IV or IV(a) will affect agricultural lands in the project area. Figure V-9 indicates the location of farmlands that are affected by the Build Alternatives.

The following Tables indicate the impacts on existing farms in the project area.

TABLE V-10

FARMLAND CONVERTED TO RIGHT-OF-WAY
(Areas in Acres*)

Farm Identification	Alternatives III/III(a) Total	Farmed	Alternatives IV/IV(a) Total	Farmed
Boglisch	20	11	19**	15**
Tuckahoe	24	15	24	15
Schmaelzle	17	10	17	10
TOTALS	61	36	60	40

* Areas shown are approximate and are based on identifiable farmed limits from project topographic maps.

** Includes a small portion of the Kosak property.

In addition to the farmland which will be converted directly by taking land for highway right of way, farmlands will be converted indirectly to non-farmable lands when access is blocked by the right of way or when a parcel becomes too small to farm economically. As indicated below, both the Boglisch and the Tuckahoe properties are affected by this type of impact.

TABLE V-11

FARMLAND CONVERTED INDIRECTLY TO NON-FARMABLE
(Areas in Acres*)

Farm Identification	Alternative III/III(a)	Alternative IV/IV(a)
Boglisch	18	1
Tuckahoe	35	32
TOTALS	53	33

* Areas shown are approximate and are based on identifiable farmed limits from project topographic maps.

Alternatives III and III(a) divide the Boglisch Tree Farm into two parcels. The northern parcel contains approximately 26 acres of "farmable" land while the southern parcel contains 18 acres of "farmable" land. Although the main access road to the existing tree farm from South West Street will be cut off by these Build Alternatives, access to the northern parcel will still be possible by means of an existing path. The path, which does not cross wetlands, could be improved to provide the necessary vehicular access.

Existing mapping shows a farm road which might provide access to the southern parcel. This road, which runs westerly from South West Street, runs through a wetland for a substantial portion of its length before it enters the "farmable" portion of this southerly parcel. It is doubtful that this access road could be improved to provide the required vehicular access. Based on the existing property line configuration, the southern portion of the Boglisch property that is farmable will be converted indirectly to non-farmable by the construction of either Alternative III or III(a).

Alternatives IV and IV(a) roughly parallel the northern line of the Boglisch property. Access to the farmable land south of these Alternatives remains unchanged from the existing condition. There is approximately one acre of the Boglisch property that is farmable which lies to the north. This property will be converted indirectly to non-farmable by Alternatives IV and IV(a).

Farmable land on the Tuckahoe Turf Farm to the northeast of all Build Alternatives would have no access. The owner has also stated that Alternative III or IV would effectively block access, and that other means of access are not economically justifiable. Hence, that portion of the property which lies to the northeast of all Build Alternatives will be converted indirectly to non-farmable.

The above data, classifications provided by the Soil Conservation Service, and information collected on the current state of development in the vicinity of the project area were used to evaluate the impacts on farmlands. The Farmland Conversion Impact Rating Form AD-1006 (developed by the U.S. Department of Agriculture, Soil Conservation Service pursuant to its authorization under FPPA) was used to perform this evaluation. All Build Alternatives are rated slightly above the threshold of 160 points. Below the 160 point threshold, impacted farmlands need receive only minimal consideration for protection. Alternatives III and III(a) received a rating of 163 points, and Alternatives IV and IV(a) received a rating of 164 points out of possible total of 260 points.

These ratings indicate that the farmlands affected by the Build Alternatives should receive consideration for protection as part of the overall decision process. Based solely on the FPPA rating system, it appears that there is negligible difference between Alternative III/III(a) and IV/IV(a) with respect to the conversion of farmlands to nonagricultural uses.

Alternatives III, III(a), IV and IV(a) all have comparable impacts on the Schmaelzle and Tuckahoe properties in terms of land converted directly and indirectly. Alternative III or III(a) will have greater adverse effects on the Boglisch farm than Alternative IV or IV(a). Alternative III or III(a) bisects the Boglisch property, taking 20 acres directly and severing 18 acres to the north of the right of way. Alternative IV or IV(a), acquires a comparable number of acres directly, however it severs only one acre to the north.

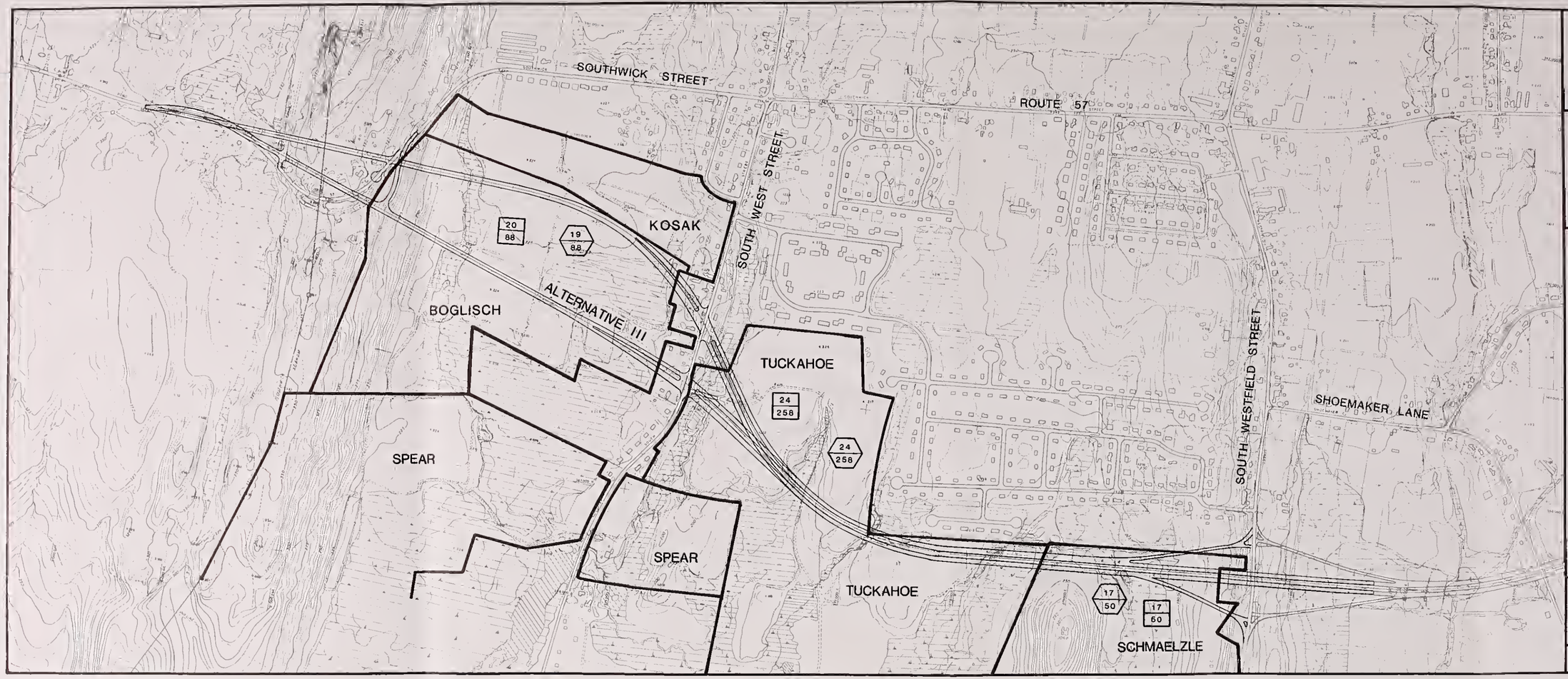
Due to impacts on the Boglisch farm, Alternatives III or III(a) are considered to have greater adverse effects on farmlands than Alternatives IV or IV(a).

I. SPECIAL OR HAZARDOUS WASTES

Except for the laboratory identification of diesel fuel in one (1) of the soil samples recovered from the property at #364 South Westfield Street, investigations indicate that no hazardous waste locations should be encountered within the right-of-way of either Alternative III/III(a) or IV/IV(a).

In 1990 field investigations were conducted of a residence at 336 South Westfield Street and a former concrete block and steel fabrication facility at 364 South Westfield Street. Fifteen test pits were excavated. No underground tanks were located.

THIS PAGE INTENTIONALLY LEFT BLANK



COMMONWEALTH OF MASSACHUSETTS
DEPARTMENT OF PUBLIC WORKS

ROUTE 57 RELOCATION

FARMLAND AREAS AFFECTED

LEGEND

ALTERNATIVES III & III(a): A - IMPACTED ACRES / X - TOTAL ACRES

ALTERNATIVES IV & IV(a): A - IMPACTED ACRES / X - TOTAL ACRES

N

0 600 1200

HOR. SCALE IN FEET

FIG. NO. V-9

J. AIR QUALITY

1. 1993 Mesoscale Impacts - Alternatives III and IV

Total mesoscale emissions in 1993 both with and without the proposed project are listed in Table V-12. CO and NMHC emissions will decrease in 1993 if the proposed Route 57 Relocation Project is built (Alternatives III or IV).

The decreases for CO are 15.0 kg/day (Alternative III), and 7.4 kg/day (Alternative IV), respectively. The emission decreases for NMHC when compared to the no-build condition (Alternative I) are 5.0 kg/day (Alternative III) and 3.6 kg/day (Alternative IV). CO and NMHC emissions improve with the Build Alternatives III or IV due to shifts in traffic volumes, higher Relocated Route 57 speeds, and fewer delays at the busiest intersections. Alternative III is slightly shorter than Alternative IV, and given comparable traffic volumes and operating speeds, it shows slightly lower CO and NMHC emissions than Alternative IV.

NOx emissions in 1993 will increase slightly by 5.9 kg/day (Alternative III), or by 8.1 kg/day (Alternative IV) with the project. Unlike CO and NMHC, NOx emissions generally increase as vehicle speed increases. Note that the 1993 Build NOx emissions will still be lower by 9.3 kg/day (Alternative III), or 7.1 kg/day (Alternative IV) than the 1988 existing emissions. In this case, it appears that mesoscale emissions of CO, NMHC, and NOx will be lower if Alternative III is built instead of Alternative IV. All Build Alternatives satisfy the State Implementation Plan (SIP) consistency criteria.

2. 2013 Mesoscale Impacts - Alternatives III and IV

Total mesoscale emissions in 2013 (Design Year) both with and without the proposed project are compared to existing conditions in Table V-12. CO and NMHC emissions will decrease in 2013 if any of the Build Alternatives are implemented.

The decreases for CO are 91.8 kg/day (Alternative III), and 88.5 (Alternative IV) respectively. The decreases for NMHC when compared to the no-build condition (Alternative I) are 12.1 kg/day for Alternative III and 10.7 kg/day for Alternative IV. CO and NMHC emissions improve with the Build Alternatives due to shifts in traffic volumes, higher Relocated Route 57 speeds, and fewer delays at overcrowded intersections. Alternative III is slightly shorter than Alternative IV. Because both traffic volumes and operating speeds are comparable for both Alternatives, Alternative III shows slightly lower CO and NMHC emissions than Alternative IV.

NOx emissions in 2013 will increase slightly by 3.9 kg/day (Alternative III), or by 6.1 kg/day (Alternative IV) with the project. Unlike CO and NMHC, NOx emissions generally increase as vehicle speeds increase. For the 2013 Build Condition, NOx will be lower than those for the 1988 Existing Conditions and the 1993 No Build Condition.

Of the various build options, Alternative III yields the lowest emissions of CO, NMHC, and NOx. Alternative III and Alternative IV both satisfy the SIP consistency criteria.

3. 1993 Mesoscale Impacts - Alternatives III(a) and IV(a)

Construction of a grade-separation at South West Street and Relocated Route 57 will increase mesoscale emissions in 1993 as compared to the at-grade intersection Alternatives III and IV.

The increases for CO are 130.6 kg/day (Alternative III(a)) and 132.0 kg/day (Alternative IV(a)), respectively, while increases for NMHC are 26.5 kg/day (Alternative III(a)) and 26.7 kg/day (Alternative IV(a)). NOx emissions increase by 35.7 kg/day (Alternative III(a)) and 36.1 kg/day (Alternative IV(a)), when compared to the at-grade Alternatives. Mesoscale emissions increase for all three pollutants due to the extra vehicle miles traveled which result from the loss of an intersection at South West Street and Relocated Route 57.

In 1993, Alternatives III(a) and IV(a) do not yield lower NHMC emissions than the No-Build case (Alternative I). In this instance, the SIP requires that MHD consider all "reasonable and feasible hydrocarbon reduction/mitigating measures." Whereas the proposed project generates no trips, traffic demand reduction is not feasible. The only feasible reduction measure is to select a different build alternative. The selection of Alternatives III or IV over III(a) or IV(a) may or may not be reasonable depending on factors unrelated to air quality.

4. 2013 Mesoscale Impacts - Alternatives III(a) and IV(a)

Construction of a grade-separation at South West Street and Relocated Route 57 under Alternatives III(a) and IV(a) will increase mesoscale emissions in 2013 as compared to the at-grade design.

The increase for CO are 62.2 kg/day (Alternative III(a)) and 63.0 kg/day (Alternative IV(a)), respectively, while increases for NMHC are 24.1 kg/day (Alternative III(a)) and 24.5 kg/day (Alternative IV(a)) in comparison to the No-Build Case. NOx emissions increase by 35.3 kg/day (Alternative III(a)) and 35.9 kg/day (Alternative IV(a)) when compared to the at-grade design. Mesoscale emissions increase for all three pollutants due to the extra vehicle miles traveled which result from the loss of an intersection at South West Street and Relocated Route 57.

In 2013, Alternatives III(a) and IV(a) do not yield lower NHMC emissions than the No-Build case (Alternative I). In this instance, the SIP requires that MHD consider all "reasonable and feasible hydrocarbon reduction/mitigating measures." Whereas the proposed project generates no trips, traffic demand reduction is not feasible.

TABLE V-12

TOTAL MESOSCALE EMISSIONS
IN THE ROUTE 57 MESOSCALE STUDY AREA
(kg/day)

Case	CO	NMHC	NOx
1988 Existing	511.25	119.74	87.04
1993 Alt. I	297.25	59.98	71.87
1993 Alt. III	282.22	54.94	77.78
1993 Alt. III(a)	412.78	81.41	113.51
1993 Alt. IV	289.91	56.36	79.94
1993 Alt. IV(a)	421.88	83.09	116.07
2013 Alt. I	222.37	66.09	71.05
2013 Alt. III	130.56	53.96	74.98
2013 Alt. III(a)	192.75	78.09	110.30
2013 Alt. IV	133.92	55.37	77.12
2013 Alt. IV(a)	196.93	79.82	112.99

kg/day = kilograms per day

(a) = S. West St./New Route 57 Grade-Separated

5. 1993 Microscale Impacts (CO) - Alternatives III and IV

In 1993 under Alternatives III or IV, all 1-hour and 8-hour CO levels are in compliance with the NAAQS. Microscale modeling results are unchanged at all but two intersections in 1993 regardless of whether or not Alternative III or Alternative IV is constructed. The twelve receptors around the intersection of Relocated Route 57 and South West Street and the nine receptors around the intersection of Relocated Route 57/Existing Route 57 will experience different maximum CO levels depending on which Alternative is chosen. This is due to the location of the sensitive receptors from the travelled roadway. It is the location of the roadway which differs between Alternative III and IV. Project-wide, there is a decrease of approximately 13% (Alternative III), or 12% (Alternative IV) for the peak 1-hour period while a 9% (Alternative III) or 11% (Alternative IV) decrease is seen for the peak 8-hour period when compared with concentrations under the 1993 No-Build case. The decreases are due to shorter queue lengths at the intersections and improved traffic flow.

The modeling results for Alternative III in 1993 show that all receptors are in compliance with the NAAQS. Maximum 1-hour CO values range from 3.1 to 6.7 ppm while 8-hour concentrations range from 2.0 to 4.4 ppm.

The modeling results for the 1993 Alternative IV case also show that all receptors are in compliance with the NAAQS. Maximum 1-hour CO values range from 3.1 to 6.7 ppm, while the 8-hour concentrations range from 2.0 to 4.4 ppm.

6. 2013 Microscale Impacts (CO) - Alternatives III and IV

Alternatives III and IV show no violations of the 1-hour and 8-hour NAAQS in the year 2013. Microscale modeling results are unchanged at all but one intersection in 2013 regardless of whether or not Alternative III or IV is constructed. The twelve receptors around the intersection of Relocated Route 57 and South West Street will experience different maximum CO levels depending on which Alternative is chosen. Project-wide, there is a decrease of 10% (Alternative III), or 9% (Alternative IV) for peak 1-hour concentrations while 8-hour concentrations show a decrease of less than 4% (Alternatives III and IV) when compared with values under the 2013 No-Build Alternative I. These decreases are due to shorter queue lengths at several intersections and improved traffic flow within the entire network.

The modeling results for the 2013 Alternative III show that all receptors are in compliance with the 1-hour and 8-hour NAAQS. Maximum 1-hour CO values range from 3.0 to 5.2 ppm while 8-hour concentrations range from 2.0 to 3.2 ppm.

The modeling results for the 2013 Alternative IV show that all receptors are in compliance with the 1-hour and 8-hour NAAQS. Maximum 1-hour CO values range from 3.0 to 5.2 ppm while 8-hour concentrations range from 2.0 to 3.2 ppm.

7. 1993 Microscale Impacts (CO) - Alternatives III(a) and IV(a)

A grade-separation at the intersection of Relocated Route 57 and South West Street affects the traffic network distribution in the study area. Due to the loss of a direct connection from Relocated Route 57 to South West Street, vehicle miles traveled and approach volumes at the other intersections in the study area increase. This is reflected in higher receptor concentrations at all intersections except one, as compared to the 1993 at-grade design (Alternatives III and IV). Receptor concentrations at Existing Route 57 and South Westfield Street decrease under the grade-separation scenario, but this is due to a change in the operation of the traffic signal rather than a decrease in volume.

Project-wide, there is an increase of 3% for Alternatives III(a) and IV(a) for peak 1-hour concentrations, while 8-hour concentrations show an increase of 3% for both Alternatives.

The modeling results for the 1993 Alternative III(a) and IV(a) show that all receptors are in compliance with the 1-hour and 8-hour NAAQS. Maximum 1-hour CO values range from 3.4 to 7.5 ppm while 8-hour concentrations range from 2.1 to 4.1 ppm.

8. 2013 Microscale Impacts (CO) - Alternatives III(a) and IV(a)

A grade-separation at the intersection of Relocated Route 57 and South West Street affects the traffic network distribution in the study area. Due to the loss of a direct connection from Relocated Route 57 to South West Street, vehicle miles traveled and approach volumes at the other intersections in the study area increase. This is reflected in higher receptor concentrations at all intersections except one, as compared to the 2013 at-grade case (Alternatives III and IV). Receptor concentrations at Existing Route 57 and South Westfield Street decrease under the grade-separation scenario, but this is due to a change in the operation of the traffic signal rather than a decrease in volume.

Project-wide, there is a decrease of less than 1% for Alternatives III(a) and IV(a) for peak 1-hour concentrations, while 8-hour concentrations show an increase of less than 1% for both Alternatives III(a) and IV(a).

The modeling results for Alternative III(a) and IV(a) in 2013 show that all receptors are in compliance with the 1-hour and 8-hour NAAQS. Maximum 1-hour CO values range from 3.1 to 5.2 ppm while 8-hour concentrations range from 2.0 to 3.4 ppm.

Tables V-13 and V-14 present 1-hour and 8-hour CO Concentrations at Sensitive Receptors for the various Alternatives under consideration. The Tables are followed by Figure V-10 which depicts the Air Quality Receptor Locations.

TABLE V-13

PREDICTED MAXIMUM 1-HOUR CO CONCENTRATIONS AT SENSITIVE RECEPTORS PLUS BACKGROUND* (ppm)

Receptor	1988	1993 Alt. I	1993 Alt. III & IV	1993 Alt. III (a) & IV (a)	2013 Alt. I	2013 Alt. III & IV	2013 Alt. III (a) & IV (a)
Existing Rt. 57/Rt. 187							
1. Schoolyard	16.4	11.6	6.7	6.0	7.1	4.3	4.1
2. L & A Realtors	11.7	10.5	5.4	4.7	6.2	3.9	3.8
3. BayBank ATM	13.4	8.9	6.1	4.9	5.5	4.3	4.0
4. Furniture Store	18.1	9.9	8.2	6.0	6.5	5.2	4.4
5. Pride Gas Station	12.7	9.6	6.5	5.3	6.3	4.4	4.1
Existing Rt. 57/N. West St./S. West St.							
6. Residence #323	7.5	5.3	4.0	4.1	3.9	3.5	3.5
7. Residence #6	7.3	4.9	3.9	4.1	4.0	3.4	3.5
8. Residence #3	6.9	5.1	4.1	4.1	4.0	3.5	3.5
9. Residence #312	6.2	4.8	3.4	3.6	3.8	3.1	3.1
Route 187/Shoemaker Lane							
10. Empty Lot SE	14.2	8.1	5.5	7.5	4.8	4.2	4.4
11. Residence #216	9.6	5.1	3.8	4.3	4.0	3.8	3.9
12. Empty Lot NW	13.0	5.8	4.2	4.9	4.3	4.0	4.0
13. Residence	7.5	4.1	3.5	3.8	3.6	3.4	3.4
14. Suburban Garage	11.3	6.9	4.9	6.2	4.4	4.1	4.2
New Rt. 57 EB Ramps/Rt. 187							
15. Luigi's Auto Body	3.4	3.3	3.3	3.4	3.2	3.6	3.9
16. Residence #394	3.8	3.7	3.6	3.6	3.5	3.5	3.5
New Rt. 57 WB Ramps/Rt. 187							
17. Empty Field NE	3.5	6.7	5.6	7.0	4.6	4.4	4.5
18. Residence #3	3.4	5.8	3.9	6.0	4.5	4.2	4.3

(Table continued on next page)

TABLE V-13 (continued)

Receptor	1988	1993 Alt I	1993 Alt. III	1993 Alt. III (a)	1993 Alt. IV	1993 Alt. IV (a)	2013 Alt. I	2013 Alt. III	2013 Alt. III (a)	2013 Alt. IV	2013 Alt. IV (a)
New Rt. 57/South West St.											
19. Empty Field NE	3.2	3.1	3.1	NA	3.1	NA	3.0	3.1	NA	3.1	NA
20. Empty Field SE	3.2	3.1	3.1	NA	3.1	NA	3.0	3.1	NA	3.1	NA
21. Empty Field SW	3.2	3.1	3.1	NA	3.1	NA	3.0	3.1	NA	3.1	NA
22. Residence #292	3.1	3.1	3.1	NA	3.2	NA	3.0	3.1	NA	3.1	NA
23. Empty Field SE	3.2	3.0	5.0	NA	3.1	NA	3.0	4.4	NA	3.1	NA
24. Residence #244	3.2	3.0	5.0	NA	3.1	NA	3.0	3.9	NA	4.0	NA
25. Residence	3.2	3.0	5.3	NA	3.1	NA	3.0	4.1	NA	3.1	NA
26. Residence #187	3.1	3.1	5.3	NA	3.2	NA	3.0	4.2	NA	3.1	NA
27. Receptor NE	3.2	3.0	3.1	NA	5.2	NA	3.0	3.9	NA	3.1	NA
28. Receptor SE	3.2	3.0	3.1	NA	5.4	NA	3.0	4.1	NA	3.1	NA
29. Receptor SW	3.2	3.0	3.1	NA	5.5	NA	3.0	3.0	NA	4.3	NA
30. Receptor NW	3.1	3.0	3.1	NA	4.8	NA	3.0	3.0	NA	3.1	NA
Existing Rt. 57/New Rt. 57											
31. Residence #662	3.2	3.1	NA	NA	NA	NA	3.1	NA	NA	NA	NA
32. Residence #316	3.2	3.0	NA	NA	NA	NA	3.0	NA	NA	NA	NA
33. Woods	3.6	3.1	3.7	3.8	NA	NA	3.0	4.2	4.2	NA	NA
34. Woods West	NA	NA	4.7	4.8	NA	NA	NA	5.0	5.2	NA	NA
35. Woods East	NA	NA	4.2	4.3	NA	NA	NA	4.4	4.5	NA	NA
36. Woods East	NA	NA	NA	NA	3.5	3.4	NA	NA	NA	4.0	4.1
37. Woods South	NA	NA	NA	NA	3.5	3.6	NA	NA	NA	4.0	4.1
38. Woods West	NA	NA	NA	NA	3.1	3.5	NA	NA	NA	3.9	4.0
39. Residence	NA	NA	NA	NA	3.1	3.4	NA	NA	NA	4.3	4.0
NAAQS	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0

* - CO background levels of 3.0 ppm (1 hour) are included for all study years and alternatives.
(a) - South West Street and New Route 57 under grade-separation

TABLE V-14

PREDICTED MAXIMUM 8-HOUR CO CONCENTRATIONS AT SENSITIVE RECEPTORS PLUS BACKGROUND* (ppm)

Receptor	1988	1993 Alt. I	1993 Alt. III & IV	1993 Alt. III (a) & IV (a)	2013 Alt. I	2013 Alt. III & IV	2013 Alt. III (a) & IV (a)
Existing Rt. 57/Rt. 187							
1. Schoolyard	8.6	6.8	3.9	3.6	4.4	2.8	2.8
2. L & A Realtors	5.6	4.3	3.0	2.7	3.4	2.5	2.4
3. BayBank ATM	6.3	5.0	3.5	3.1	3.4	2.7	2.5
4. Furniture Store	9.8	5.5	4.4	3.3	3.7	3.2	2.7
5. Pride Gas Station	6.5	5.1	3.5	3.0	3.4	2.7	2.5
Existing Rt. 57/N. West St./S. West St.							
6. Residence #323	4.1	2.9	2.4	2.6	2.6	2.2	2.2
7. Residence #6	3.9	2.9	2.4	2.5	2.5	2.1	2.1
8. Residence #3	3.6	2.8	2.4	2.5	2.5	2.2	2.2
9. Residence #312	3.2	2.5	2.1	2.2	2.3	2.0	2.0
Route 187/Shoemaker Lane							
10. Empty Lot SE	3.8	3.0	2.6	3.0	2.7	2.6	2.6
11. Residence #216	2.6	2.4	2.2	2.3	2.5	2.4	2.5
12. Empty Lot NW	2.9	2.6	2.4	2.4	2.6	2.4	2.6
13. Residence	2.4	2.2	2.2	2.2	2.3	2.0	2.2
14. Suburban Garage	3.4	2.9	2.5	2.7	2.7	2.5	2.5
New Rt. 57 EB Ramps/Rt. 187							
15. Luigi's Auto Body	2.1	2.1	2.1	2.1	2.1	2.2	2.6
16. Residence #394	2.3	2.3	2.2	2.3	2.3	2.3	2.3
New Rt. 57 WB Ramps/Rt. 187							
17. Empty Field NE	2.2	3.1	2.4	4.1	3.0	2.8	3.1
18. Residence #3	2.1	2.4	2.3	3.4	2.8	2.5	2.8

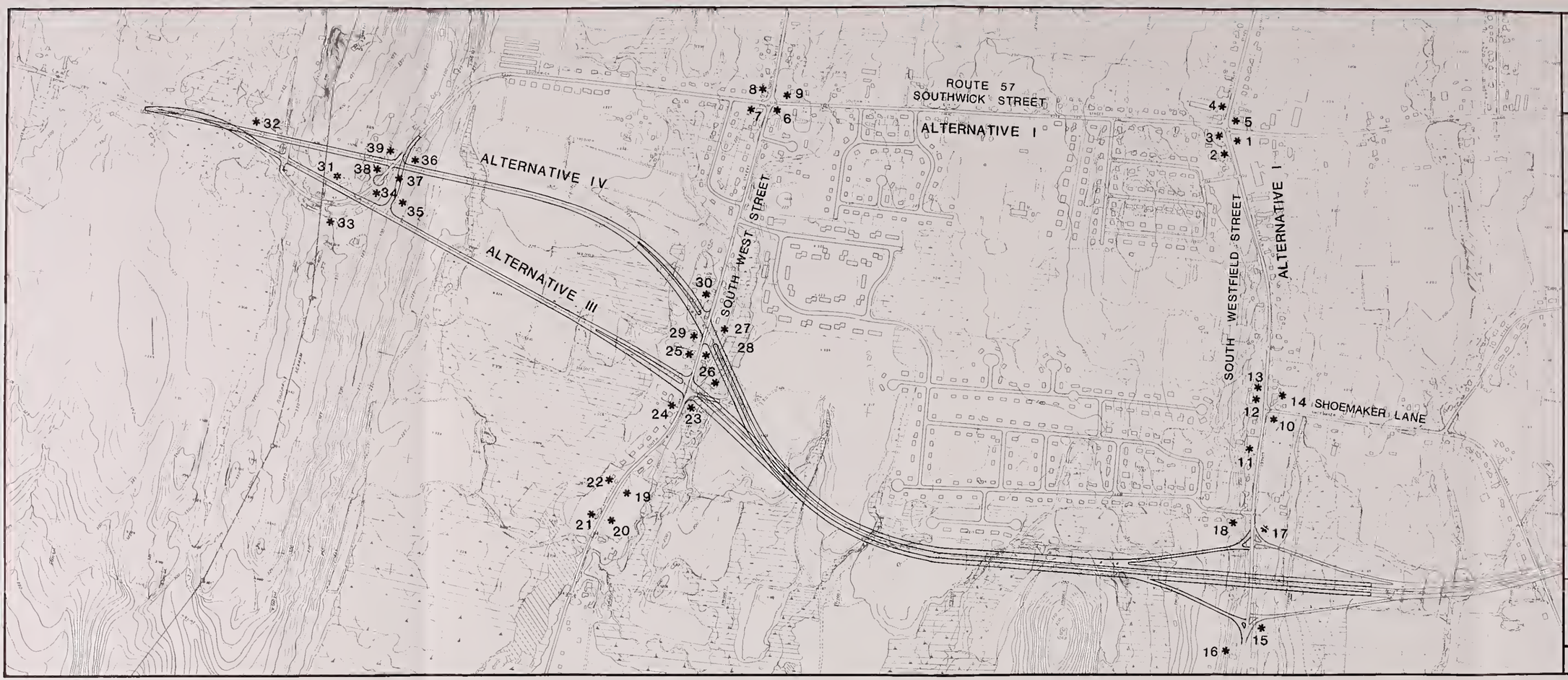
(Table continued on next page)

TABLE V-14 (continued)

Receptor	1988	1993 Alt I	1993 Alt. III	1993 Alt. III (a)	1993 Alt. IV	1993 Alt. IV (a)	2013 Alt. I	2013 Alt. III	2013 Alt. III (a)	2013 Alt. IV	2013 Alt. IV (a)
New Rt. 57/South West St.											
19. Empty Field NE	2.1	2.0	2.0	NA	2.0	NA	2.0	2.0	NA	2.0	NA
20. Empty Field SE	2.1	2.0	2.0	NA	2.0	NA	2.0	2.0	NA	2.0	NA
21. Empty Field SW	2.1	2.0	2.0	NA	2.0	NA	2.0	2.0	NA	2.0	NA
22. Residence #292	2.1	2.0	2.0	NA	2.0	NA	2.0	2.0	NA	2.0	NA
23. Empty Field SE	2.1	2.0	3.1	NA	2.0	NA	2.0	2.7	NA	2.0	NA
24. Residence #244	2.1	2.0	2.8	NA	2.0	NA	2.0	2.8	NA	2.0	NA
25. Residence	2.1	2.0	2.9	NA	2.0	NA	2.0	2.5	NA	2.0	NA
26. Residence #187	2.1	2.0	2.8	NA	2.0	NA	2.0	2.5	NA	2.0	NA
27. Receptor NE	2.1	2.0	2.0	NA	2.9	NA	2.0	2.5	NA	2.5	NA
28. Receptor SE	2.1	2.0	2.0	NA	3.0	NA	2.0	2.0	NA	2.5	NA
29. Receptor SW	2.1	2.0	2.0	NA	1.1	NA	2.0	2.0	NA	2.7	NA
30. Receptor NW	2.1	2.0	2.0	NA	0.7	NA	2.0	2.0	NA	2.4	NA
Existing Rt. 57/New Rt. 57											
31. Residence #662	2.1	2.1	NA	NA	NA	NA	2.1	NA	NA	NA	NA
32. Residence #316	2.1	2.2	NA	NA	NA	NA	2.1	NA	NA	NA	NA
33. Woods	2.3	2.8	2.8	2.4	NA	NA	2.2	2.3	2.7	NA	NA
34. Woods West	NA	NA	2.6	2.7	NA	NA	NA	2.8	3.4	NA	NA
35. Woods East	NA	NA	2.4	2.5	NA	NA	NA	2.5	3.0	NA	NA
36. Woods East	NA	NA	NA	NA	2.2	2.2	NA	NA	NA	2.2	2.7
37. Woods South	NA	NA	NA	NA	2.2	2.3	NA	NA	NA	2.2	2.7
38. Woods West	NA	NA	NA	NA	2.2	2.2	NA	NA	NA	2.2	2.5
39. Residence	NA	NA	NA	NA	2.1	2.2	NA	NA	NA	2.2	2.6
NAAQS	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0

* - CO background levels of 2.0 ppm (8 hour) are included for all study years and alternatives.
(a) - South West Street and New Route 57 under grade-separation

THIS PAGE INTENTIONALLY LEFT BLANK



COMMONWEALTH OF MASSACHUSETTS
DEPARTMENT OF PUBLIC WORKS

ROUTE 57 RELOCATION

AIR QUALITY RECEPTOR LOCATIONS

* -RECEPTOR NUMBER

FIG. NO. V-10

K. NOISE ANALYSIS

1. Introduction

Implementation of any Build Alternative will increase noise levels along the new right of way. Because the Build Alternatives will divert traffic to the new roadway and reduce traffic on Southwick Street, noise levels along existing Route 57 will decrease.

2. Methodology

The FHWA STAMINA 2.0 computer model was used to estimate traffic sound levels at all twelve study locations under Alternatives III, III(a), IV, and IV(a) for the years 1988 (Existing Condition), 1993, and 2013. The study locations are indicated on Figure V-11.

Traffic volumes used in the model are peak hour volumes (4:30 to 5:30 PM) and are expected to correspond to Level of Service C conditions. Level of Service C conditions generally correspond to periods of highest traffic sound levels. A summary of input data used to model traffic sound levels is presented in the Technical Appendix.

3. Criteria

The Federal Highway Administration (FHWA) Traffic Noise Abatement Criteria (FHPM 7-7-3) are presented in Table V-15. These criteria define various land use categories and establish maximum hourly equivalent sound levels for peak traffic noise exposure. Existing land uses in the study area fall into categories B, C or D. The study locations selected for this analysis fall into land use Category B. In accordance with FHWA criteria, exterior sound levels at the twelve study locations should not approach or exceed an hourly equivalent sound level of 67 dBA.

FHWA Technical Advisory T6640.8A dated October 30, 1987 indicates that noise impact occurs if traffic sound levels: 1) Exceed FHWA Traffic Noise Abatement Criteria, and/or 2) Result in sound levels at sensitive receptors that are "substantially" higher than those existing before the project.

In accordance with FHWA procedures, MHD defines a "substantial noise impact" as an increase of 15 dBA or more over existing conditions.

TABLE V-15

FHWA TRAFFIC NOISE ABATEMENT CRITERIA
(FHPM 7-7-3, ALSO REFERRED TO AS 23 CFR Part 772)

Activity Category	$L_{eq}(h)$	Description of Activity Category
A	57 (Exterior)	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose.
B	67 (Exterior)	Picnic areas, recreation areas, playgrounds, active sports areas, parks, residences, motels, hotels, schools, churches, libraries and hospitals.
C	72 (Exterior)	Developed lands, properties or activities not included in Categories A or B above.
D		Undeveloped lands.
E	52 (Interior)	Residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals, and auditoriums.

Either $L_{10}(h)$ or $L_{eq}(h)$ (but not both) may be used on a project.

4. Traffic Noise Impacts

Hourly equivalent sound levels (Leq) for the 12 locations in the study area are summarized in Table V-16.

Under Alternatives III, III(a), IV, and IV(a) exterior noise levels at all twelve locations remain below the FHWA exterior noise standard for Category B (67 dBA).

Alternatives III and IV will produce sound level increases of 15 dBA or more over those that currently exist at Location 2 (Hendom Road area) and Location 9 (a new Hendom Heights subdivision off of Hendom Drive). A noise barrier which will reduce noise levels by 10 decibels or more has been investigated for reducing sound levels at these locations. The cost for this barrier, however, exceeds MDPW guidelines and therefore its construction is not proposed. (Refer to Section VI of this Report.)

Under the No Build Alternative, increases in background traffic will cause the FHWA exterior noise standard for Category B (67 dBA) to be reached or exceeded at residences on Southwick Street and on South Westfield Street (Locations No. 5, 6, and 7). Implementation of Alternatives III, III(a), IV, or IV(a) will reduce traffic and abate noise along Southwick and South Westfield Streets. Future noise levels in 2013 at Locations No. 5, 6, and 7 are forecast at a maximum level of 61 dBA, 63 dBA, and 64 dBA respectively under the Build Alternatives. Thus, there is no exceeding of the FHWA exterior noise standard for Category B (67 dBA) if any of the Build Alternatives are implemented.

During construction, noise from construction equipment will cause short term impacts surrounding locations, nearly all of which are residential.

TABLE V-16

PEAK TRAFFIC HOUR MEASURED AND ESTIMATED HOURLY EQUIVALENT SOUND LEVELS (dBA) FOR ALTERNATIVES I, III, IV DURING STUDY YEARS

Location No	Measured[1] L_{eq} 1988	Existing 1988	Estimated I[5] 1993	III 1993	III(a) 1993	IV 1993	IV(a) 1993	I 2013	III 2013	III(a) 2013	IV 2013	IV(a) 2013
1	51	52	52	56	55	56	55	54	58	57	58	57
2	43	44	44	59	57	59	57	45	61	60	61	60
3	62	60	60	62	60	62	60	60	64	62	63	62
4	49[2]	46	47	56	58	53	54	49	59	60	55	56
5	65	67	66	59	60	59	60	68	61	61	61	61
6	67	66	66	61	61	61	61	67	62	63	62	63
7	63	64	66	62	63	62	63	67	64	64	64	64
8	57[3]	55	55	..[7]	62	59	..	55	..	64	60	..
9	43[4]	44	44	62	59	62	59	45	64	63	64	63
10	60[6]	61	62	..	..	57	57	64	..	..	59	59
11	56[6]	57	57	56	58	61	..	57	61	60	62	..
12	47[6]	46	47	51	50	55	54	48	53	53	57	56

[1] L_{eq} (1 hour) is shown an arithmetic average of the L_{eq} (1 hour) values measured over the period of 4:00 - 6:00 PM except as otherwise noted.

[2] Measured L_{eq} (1 hour) for period 4:00 - 5:00 PM only.

[3] Estimated based on sound level measurements at Location 3.

[4] Estimated based on sound level measurements at Location 2.

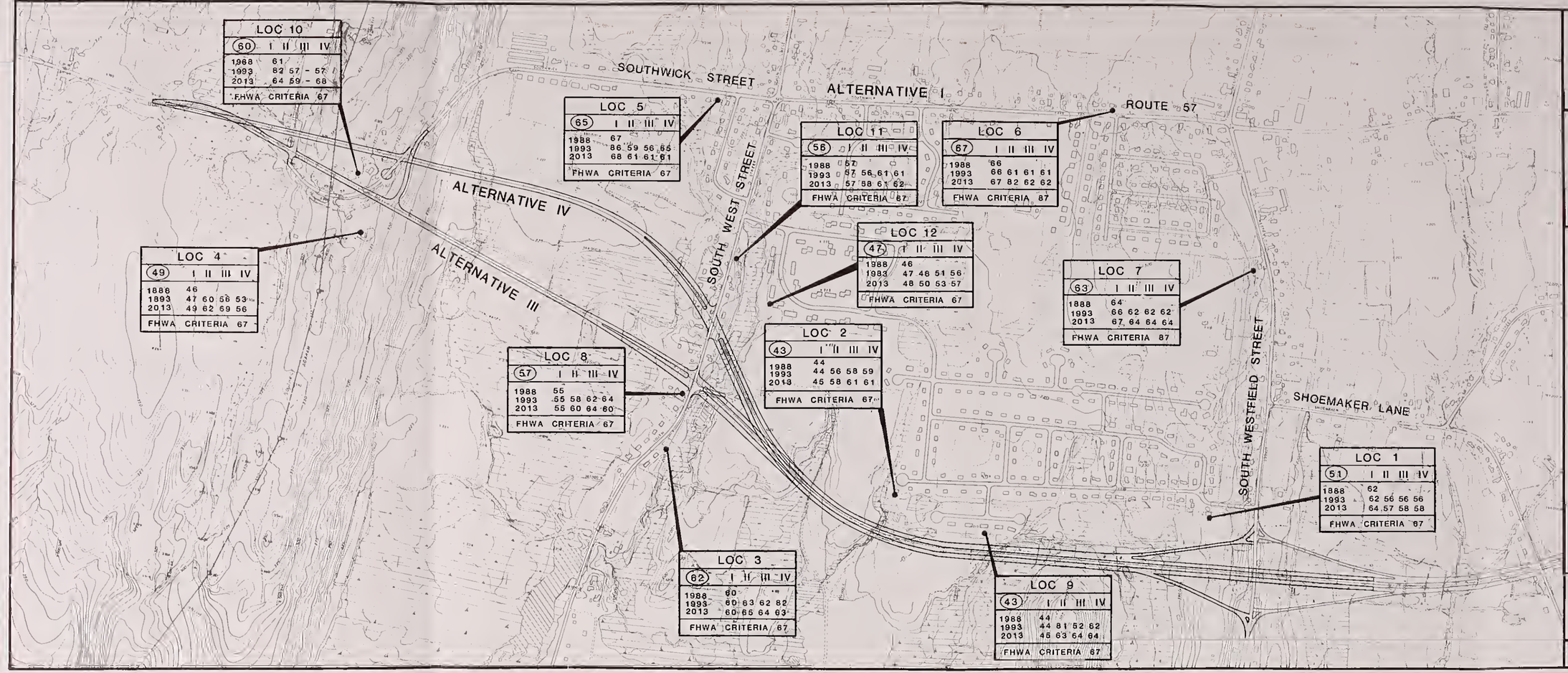
[5] Alternative I is the No-Build.

[6] L_{eq} (1 hour) shown is a logarithmic average of the L_{eq} (1/2 hour) values measured over the period of 4:30 - 5:30 PM.

[7] .. indicates that residence is taken by this alternative.

(a) = Prop. Grade Separation at S. West Street and New Route 57.

THIS PAGE INTENTIONALLY LEFT BLANK



COMMONWEALTH OF MASSACHUSETTS
DEPARTMENT OF PUBLIC WORKS

ROUTE 57 RELOCATION

NOISE ANALYSIS LOCATIONS

LEGEND

MEASURED PEAK HOUR Leq

LOC 3 — LOC. NUMBER
I II III IV — ALT. NUMBER
1988 / 1993 / 2013 — EST. PEAK TRAFFIC NOISE HOUR Leq in dBA
FHWA CRITERIA — FHWA CATEGORY B CRITERIA

N

0 600 1200

HOR. SCALE IN FEET

FIG. NO. V-11

L. HISTORICAL AND ARCHAEOLOGICAL

No sites eligible for inclusion in the National Register of Historic Places have been identified within the proposed rights of way of Alternatives III/III(a) and IV/IV(a). Accordingly, implementation of Alternatives III/III(a) and IV/IV(a) will not cause any adverse effects on archaeological or historical resources.

M. SECONDARY IMPACTS

Phase II of the Route 57 Relocation Project will decrease the traffic volume on Southwick Street (existing Route 57) and on South Westfield Street. Certain retail businesses such as gas stations and convenience stores are affected by the volume of passer-by traffic. This decrease will not measurably affect land use on these streets because local traffic will remain on these roadways and improved traffic flow will improve accessibility of individual commercial and business properties.

Construction of limited access highways can stimulate land use changes on an area wide or intercommunity basis by decreasing travel times and increasing accessibility of existing employment centers.

Under the No Build Alternative I for average traffic conditions , it is estimated that about 5 minutes will be required for through traffic to travel from the terminus of the Phase I Route 57 Relocation at South Westfield Street (via South Westfield Street and Southwick Street) to just west of the Agawam/Southwick Town Line.

TABLE V-17
ROUTE 57 RELOCATION PROJECT
ESTIMATED AVERAGE TRAVEL TIMES
FOR 2013 THROUGH TRAFFIC [1]

	No Build Alternative	Build Alternatives III/III(a) & IV/IV(a)
South Westfield Street from Relocated Route 57 to Southwick Street	1.5 Min.	N/A
Southwick Street (Relocated Route 57) from Southwick Street to South West Street	1.5 Min.	1.3 Min.
Southwick Street (Relocated Route 57) from South West Street to Limit of Project in Southwick	2.0 Min.	1.4 Min.
Project Total	5.0 Min.	2.7 Min.

[1] Based on average, non peak hour conditions.

Under the Build Alternatives, it is estimated that for average traffic conditions about 2 1/2 minutes will be required for through traffic to travel from the terminus of the Phase I Route 57 Relocation at South Westfield Street via the new Relocated Route 57 to limit of the project, just west of the Agawam/Southwick Town Line.

The decrease in travel time for through traffic in the east-west corridor is about 2 1/2 minutes. Because this difference in travel time is small, the secondary effects on area wide and intercommunity land use and population trends are considered to be negligible.

Land which will be acquired for the Route 57 Relocation right of way will diminish the tax base in Agawam and to a minimal extent in Southwick. The adverse secondary impact of decreased annual tax revenue to the Town of Agawam will be counterbalanced by ongoing growth of the area. Most of the agricultural lands that may be taken are already receiving tax reductions because the owners voluntarily placed development restrictions on their land under the APR and Chapter 61, 61a and 61b programs. Based upon the above, the adverse secondary impact of decreased tax revenue to the Town of Agawam is not considered to be significant. In Southwick, takings for highway purposes will be limited to about 1 acre and one dwelling under Alternative III/III(a) and about 1 acre of vacant land under Alternatives IV/IV(a). Due to the small size of the resulting loss of tax revenue, the adverse secondary impact of decreased tax revenue of the Town of Southwick is not considered to be significant.

Vehicular operations expend energy. Under the No Build Condition, through traffic is forced to utilize a relatively long and indirect route, and peak hour traffic is subject to delays due to capacity constraints at intersections on South Westfield and Southwick Streets. Additional energy is expended by vehicles, particularly heavy vehicles, which are forced to use the steep grades on existing Route 57 approaching the Agawam/Southwick Town line.

Under Alternatives III and III(a), the length of the through trip from South Westfield Street to west of the Agawam/Southwick Town Line is shortened from about 2 3/4 miles to 2 miles, thus decreasing total vehicle miles traveled (VMT). Under Alternatives IV and IV(a), the length of the through trip will be shortened to about 2 1/8 miles. Under Alternatives III/III(a) and IV/IV(a), travel time for through traffic using the relocated highway under average conditions will be shortened by about 2 1/2 minutes and congestion and delays will be minimal. These decreases in VMT, travel time, and congestion will serve to decrease energy consumption.

Vehicular operations under the Build Alternatives will be upgraded and energy efficiency will improve. The centerline gradient on the relocated highway is flatter than the existing grade on Southwick Street near the Agawam/Southwick Town Line.

In comparison to the No Build Alternative, Alternatives III/III(a) and IV/IV(a) will reduce total energy expenditure by vehicles in the project area.

VI. MITIGATING MEASURES

A. GENERAL

As part of the identification and evaluation of environmental impacts set forth in Section V, mitigation measures have been developed and evaluated which will effectively attenuate many of the identified adverse impacts of the proposed project. These mitigating measures will be implemented during the design, construction, and operational stages of the proposed project as appropriate.

Section V typically includes a re-evaluation of each impact upon implementation of the mitigation. The final determination of significance of impacts relies upon implementation of these mitigating measures.

Certain mitigating measures, particularly those recommended to attenuate impacts on wetlands, floodplains, water quality, and wildlife, necessitates work within or near wetlands. All work in wetlands including provision of the mitigating measures is subject to authorization under the Section 404 Permit Process or the Massachusetts Wetland Protection Act. Accordingly, the recommended mitigating measures are subject to authorization and modification by the Corps of Engineers, U.S. EPA, U.S. Fish and Wildlife Service, the Massachusetts Department of Environmental Protection, the Agawam Conservation Commission and Southwick Conservation Commission.

The mitigating measures set forth herein are developed only in sufficient detail to determine their general feasibility. These measures are subject to refinement during final design of the proposed project.

B. HIGHWAY DESIGN STANDARDS

Proper use of accepted highway design procedures is effective in minimizing unavoidable adverse environmental impacts. Therefore, the construction specifications will be prepared in accordance with the Commonwealth of Massachusetts Standard Specifications for Highways and Bridges, 1988 edition, the Massachusetts Department of Public Works Highway Design Manual, 1989 edition, as well as A Policy on Geometric Design of Highways and Streets, 1990 edition as prepared by the American Association of State Highway and Transportation Officials, and construction procedures will conform to the Construction Standards Manual, 1977 edition, prepared by the Massachusetts Department of Public Works, the guidelines of the Federal Aid Highway Program Manual of the Federal Highway Administration, and the environmental impact guidelines and policies of the Massachusetts Highway Department.

C. TRAFFIC MAINTENANCE/CONSTRUCTION CONTROLS

Traffic control devices will be provided as necessary for controlling and maintaining traffic during construction.

Regulatory warning and guide signs, traffic control signals, pavement markings, lighting, designated travel speeds, and other traffic safety devices will be provided during construction to provide the safe and orderly flow of traffic and allow pedestrian crossings.

Due to the nature of construction activities, operations tend to extend beyond the limits of the roadway themselves. These operations include the storage of materials, temporary access roads, and related activities. Construction activities are controlled by providing specific conditions that require a work program within certain limitations.

Section III.E. of this Report provides a more detailed description of the mitigation measures related to truck traffic for the hauling and disposal of surplus excavated materials during construction of the proposed project.

D. SOIL EROSION AND SEDIMENTATION

MHD Highway Design Standards require inclusion of measures to control erosion and sedimentation during construction. Required practices include placement of loam, seed, and mulch on the slopes; use of sedimentation and detention basins, diversion channels, hay bales and/or siltation fencing; planting of quick-growing grasses; and comparable measures.

To mitigate the adverse impacts on water quality and wetlands due to increased erosion and sedimentation, MHD will provide other mitigating measures such as:

- Embankment slopes will be no steeper than 2:1 and will be constructed according to the MHD's Specifications for Highways and Bridges.

- Diversion channels will be cut into the slopes to divert sediments to sediment basins during construction. The same channels can be used after construction to collect and treat the stormwater runoff from road surfaces.

- Cut slopes over 30 feet in height will be constructed with flat bench areas to prevent erosion of the slope face.

E. WATER QUALITY

To mitigate the adverse impacts on water quality, the following mitigating measures will be provided:

- De-icing salts will be applied in accordance with recommended standards in order to prevent excessive buildup of salts in discharge areas.

- Minimize increases in ammonia and nutrients by limiting the amount of fertilizer to be used on grassed areas or other roadside landscape elements, except as required to ensure successful establishment during the first year of growth.

- Discharges from the storm drainage system will be located in areas that are well flushed to encourage dilution of road salt concentrations.

- Provide sedimentation basins or stormwater detention basins at all discharge points from the closed drainage system west of South West Street prior to discharge into streams or wetlands.

- Provide oil and grease separators down gradient of these basins.

- Provide sumps and pipe elbows in catchbasins to trap petroleum products and sediments.

F. FLOODPLAIN MANAGEMENT

To mitigate the adverse impacts on flooding, the following mitigating measures will be provided:

- Provide stormwater detention basins at the discharge point of the storm drainage system to attenuate increases in the peak rate of stormwater discharge.
- Ensure that the design of cross culverts is adequate to pass design storm events without ponding outside of the right-of-way.
- Provide compensatory flood storage in the replacement wetland areas.

G. WETLANDS

Implementation of Alternative III, III(a), IV or IV(a) will result in the filling of wetlands within the project area. To mitigate the loss of these filled wetlands, replacement wetlands will be created as part of the construction of the proposed project. A summary of the areas of filled wetlands vs. the areas of proposed replacement wetlands for each Build Alternative under both the Federal Clean Water Act (Federal Definition) and the MA Wetlands Protection Act (MA Definition) is as follows:

TABLE VI-1

COMPARISON OF WETLANDS FILLED AND REPLACED UNDER FEDERAL AND MA DEFINITIONS

	Alt. III	Alt. III(a)	Alt. IV	Alt. IV(a)
Federal Definition				
Wetlands Filled (Acres)	9.2	9.0	10.3	9.9
Wetlands Replaced (Acres)	12.0	12.0	11.2	11.2
Ratio (Replaced/Filled)	1.3/1	1.3/1	1.1/1	1.1/1
MA Definition				
Wetlands Filled (Acres)	6.6	6.4	7.7	7.3
Wetlands Replaced (Acres)	12.0	12.0	11.2	11.2
Ratio (Replaced/Filled)	1.8/1	1.9/1	1.5/1	1.5/1

As explained in greater detail in Section V of this Report, the difference between the wetland fill areas for the Federal and MA definitions is due to the approximate 2.6 acres of filling in Wetland Area No. 15.

A more detailed discussion of the proposed mitigation measures for wetland replacements under both the Federal and MA Acts is as follows:

1. Federal Clean Water Act

The replacement wetland areas will be graded to an elevation where water will be available to the root zone of the wetland plants. The drainage within these replacement areas will be designed to allow wetlands which are separated by the roadway to continue their ecological and flood storage functions to the maximum degree possible. Detailed designs for wetland replacement areas will be developed during the final design phase of the proposed project.

The replacement wetlands will be constructed during the summer, fall and winter seasons, and vegetative work and planting will take place during the spring and fall. The initial phase of the wetland replacement will involve removal of existing vegetation, excavation and grading. Once the initial site preparation is complete, soil preparation involving final grading and placement of organic soils and topsoils will begin. A majority of the organic soil necessary for preparation of the wetland replacement areas will be available from within the project limits. It may be necessary to import some material from off-site to serve as topsoil.

The final mitigation plans will include the following design considerations for the proposed replacement wetlands:

- The surface elevation will be established in a manner such that the seasonal groundwater levels will maintain the wetland character and will permit similar seasonal and storm flow inundation. This latter function will promote the prevention of pollution and flooding protection interests of the Wetlands Protection Act. The groundwater elevation will be monitored for one year.

- The design will specify the site preparation techniques - rough grading, the depth and placement techniques of the organic soils, and a planting list with species composition and spatial patterns for wetlands which contain multiple cover types.

The proposed mitigation areas are typically located within land areas otherwise acquired for highway purposes such as uneconomic remnants. The anticipated width of the roadway excavations and embankments associated with Relocated Route 57 requires use of most of the right of way, resulting in very little land available within the right of way width for wetland replacement areas. Where practicable, conceptual wetland replacement areas are identified within the proposed right of way.

Under Alternatives III or III(a), four replacement wetland areas will be provided. Replacement Wetland Areas A, B, C and F contain a total of 12.0 acres.

Four replacement wetland areas will be provided under Alternatives IV or IV(a). Replacement Wetland Areas A, D, E, and F contain a total of 11.2 acres.

These replacement wetland areas are summarized in the following Table VI-2, and are depicted in Figure VI-1.

Area A is located on the Tuckahoe Turf Farm, between Wetland Areas #1 and #2, north of the proposed Alternatives III and IV. The area is currently vegetated with grasses (cultivated), with small shrubs and upland forest when present.

A 5.8 acre scrub-shrub wetland area will be developed in this area. It will be hydraulically connected to the wetland areas via ground water and connection to the two unnamed tributaries to Still Brook. Additionally, a swale will be provided to divert surface water through the mitigation site.

In a similar fashion, Area A could be located on the south side of proposed Alternatives III and IV. Final selection for location of this replacement area will be based on further evaluations during the subsequent study and design phases for the project.

Area A will have a low effectiveness for aquatic diversity and abundance and for wildlife diversity and abundance during migration periods. The low effectiveness rating is due to the lack of surface water in this predominantly saturated site and the lack of available food such as waste grains and tubers.

Groundwater discharge, sediment stabilization, production export as well as the wildlife values of breeding and wintering were evaluated. It is predicted that the area will have a moderate effectiveness to perform such functions. The former three functions are generally associated with the intermittent influx and discharge of water through the proposed swale, and the large size of the mitigation area (5.8 acres) which will be vegetated with shrub and emergent species. This species composition, as well as the physical location of this mitigation site between two existing forested wetland areas, contribute to the latter wildlife functions of breeding and wintering.

Area A is rated as having a high effectiveness for floodflow alteration, sediment and toxicant retention, and nutrient removal/transformation. Area A is also assessed as having a high opportunity to perform the sediment and nutrient related functions. The high rating for these functions is due to the size of the proposed wetland area, the presence of an intermittent inlet and outlet, the proposed vegetation composition, and proximity to existing wetlands.

Area B is located adjacent to Wetland Areas #5 and #6. This upland site is currently cultivated with ornamental trees and shrubs. Creation of approximately 0.5 acres of a emergent/scrub-shrub wetlands will be accomplished mainly within the proposed highway right of way, however, it will include a small portion of upland just outside of the right of way. Utilizing this small parcel located just outside of the right of way eliminates a small upland island consisting of ornamental plantings which have a low value for wildlife. Shrubs and saplings indigenous to the area will be planted, creating a scrub-shrub wetland which over the years will mature into a forested wetland. Area B will be designed to perform such wetland functions as ground water discharge, sediment stabilization, nutrient removal/transformation and wildlife habitat.

Area C is located adjacent to Wetland Area #8, south of Alternative III. This site is currently part of the Boglisch Tree Farm and is cultivated with ornamental trees and shrubs. The relocation of the highway will block access to this land parcel, thereby making this area a desirable location for wetland replacement. The area will have an approximately 100 to 300 foot buffer from the proposed highway. This buffer will provide an important ecological zone between uplands and freshwater wetlands, and will act as a filtration area to remove and store nutrients and pollutants in stormwater. The 4.5 acre replacement area will consist of palustrine, scrub-shrub, emergent and open water wetlands. The irrigation pond present in this area will be enlarged and provided with an irregular edge and vegetated with emergent species along the edge of the water. The irregular edge will result in a frictional resistance to flow, enhancing nutrient retention and removal, and is more likely to provide a variety of foods, protection from wind and natural boundaries for breeding territories.

TABLE VI-2

WETLAND MITIGATION AREAS[1]

MITIGATION SITE	BUILD ALTERNATIVE	EXISTING USE/ VEGETATION	PROPOSED WETLAND TYPE	ALTS. III/III(a) PROP. WETLAND YIELD (ACRES)	ALTS. IV/IV(a) PROP. WETLAND YIELD (ACRES)
A.	III, III(a), IV, IV(a)	Turf Farm/ Grass	Scrub-Shrub	5.8	5.8
B.	III, III(a)	Turf Farm/ Ornamental Trees and Shrubs	Emergent/ Scrub-Shrub	0.5	-
C.	III, III(a)	Turf Farm/ Ornamental Trees and Shrubs	Forested and Open Water/ Emergent	4.5	-
D.	IV, IV(a)	Turf Farm/ Grass	Shrub	-	3.2
E.	IV, IV(a)	Lawn-Road/Grass Ornamental Trees & Shrubs	Emergent, Scrub-Shrub, Open Water	-	1.0
F.	III, III(a), IV, IV(a)	Parking Area Garden/Field	Scrub-Shrub	1.2	1.2
TOTAL ALTERNATIVE III OR III(a) WETLAND REPLACEMENT AREA				12.0	
TOTAL ALTERNATIVE IV OR IV(a) WETLAND REPLACEMENT AREA					11.2

[1]Based upon measurements taken from 200 scale drawings and are reported to the nearest 1/10 acre.

The remainder of Area C is anticipated to mature and develop into a forested wetland area. This mitigation site will replace forested, emergent and open water areas impacted as a result of the proposed project. This area will provide the wetland functions of ground water discharge, floodflow alteration, sediment stabilization, sediment/toxicant retention, nutrient removal/transformation and wildlife habitat. In addition, this area will provide for floodplain mitigation. Seasonal flooding will provide hydrologic conditions necessary for sustaining the wetland replacement area.

Area D will contain 3.2 acres and is located on the Tuckahoe Turf Farm property, east of and adjacent to Wetland Area #3, north of Alternative IV. The mitigation area will be excavated to a point where the interface with the ground water table will facilitate a saturated environment. The area will be planted with shrubs similar in species composition to those existing in Wetland Area #3, typically willow (Salix sp.), and dogwood species (Cornus sp.).

The analysis for mitigation Area D indicates that the area will have a low effectiveness for groundwater discharge, aquatic diversity and the wildlife functions of breeding and migration. These low ratings are due to the lack of surface water associated with a predominantly saturated hydroperiod. The proposed intermittent surface water, facilitated by a swale created for the displacement of storm water, will provide a moderate rating for the function of production export.

Floodflow alteration, sediment/toxicant retention, nutrient removal and transformation, and sediment stabilization were rated as having a high effectiveness in Area D. Additionally, the former three functions were rated as having a high opportunity to carry out these functions. Wildlife diversity and abundance for wintering was rated as medium. The primary reason for the values indicated for these functions is the presence of shrub and emergent vegetation proposed throughout the mitigation area. The dense vegetation anticipated throughout the area will be effective in trapping sediments and toxicants associated with stormwater runoff. Due to the presence of cover in and around the mitigation area, a moderate degree of wildlife wintering will be provided.

Area E is located east of Wetland Area #4, north of the Boglisch Tree Nursery access road and on the south side of Alternative IV.

This area is vegetated primarily with grass and weed species and is maintained as lawn. The adjacent Wetland Area #4 is seasonally flooded and supports a red maple dominated wetland. The proposed mitigation area will be designed to incorporate an open water, emergent and scrub-shrub system. The area will be hydraulically connected to Wetland Area #4 via ground water, which will also be the source for the open water area. The hydroperiod of the mitigation area will be saturated in the shrub and emergent area and permanently flooded in the open water area.

The construction of this 1.0 acre replacement area meeting the description above, in association with the existing forested wetland, will enhance the wildlife values of the area as well as the function of ground water discharge, floodflow alteration, sediment/toxicant retention and removal and transformation of nutrients. The functions of the proposed mitigation site are anticipated to provide a habitat more suitable for wildlife than the adjacent tree farm area to be affected by the proposed project.

Area F is located near the Southwick/Agawam Town Line, adjacent to Wetland Area #9. This site is currently occupied by existing Route 57, an old dwelling foundation, early field species and roadway fill. The area also includes a small portion of a lawn/garden area associated with the adjacent dwelling.

Wetland Area #9 will be expanded by excavating to a suitable elevation which would allow seasonal flooding and saturation of this 1.2 acre mitigation area. The area will provide for the storage of flood waters, with a moderate effectiveness and high opportunity to perform this function. The planting of erect vegetation along with the presence of slow velocity waters adjacent to the relocated highway will provide for moderate effectiveness and high opportunity to remove sediment/toxicant. The wetland replacement area will support a diversity of wildlife during winter.

2. Massachusetts Wetland Protection Act

The Regulations of the MA Wetland Protection Act (The Act) detail performance standards which set thresholds of disturbance for each Resource Area regulated. Once such thresholds are exceeded, a variance including mitigation measures is required. Within the scope of the proposed project, four regulated Resource Areas will be impacted. These are: Bordering Vegetated Wetlands (BVW); Land Under Water (LUW); Land Subject to Flooding (LSF) and Bank. The thresholds for these Resource Areas are listed below:

Resource Area	Threshold of Disturbance
Bordering Vegetated Wetland (BVW)	5,000 Square Feet (0.11 Acres)
Land under Water (LUW)	5,000 Square Feet (0.11 Acres)
Land Subject to Flooding (LSF)	5,000 Square Feet (0.11 Acres)
Bank	50 Linear Feet

Impacts to Resource Areas associated with all Build Alternatives will exceed the allowable thresholds and will therefore require the creation of replacement areas. Table V-4 lists those impacts to individual Resource Areas for each Build Alternative. Six conceptual areas have been designed to replace wetland areas and functions impacted. Replacement Areas A, B, C and F, and Areas A, D, E and F, will mitigate impacts associated with Alternatives III/III(a) and Alternatives IV/IV(a) respectively.

A summary of the resources impacted and proposed replacement areas for Alternatives III/III(a) and Alternatives IV/IV(a) are presented in the following Table VI-3. Figure VI-1 shows the location of the proposed wetland replacement areas.

TABLE VI-3

SUMMARY OF RESOURCES IMPACTED AND REPLACEMENT AREAS PROPOSED

	RESOURCE AREA IMPACTED		REPLACEMENT AREA PROPOSED
	Alt. III	Alt. III(a)	Alt. III & III(a)
BVW & LUW (Acres)	6.62	6.37	12.0
LSF (Acres)	0.89	0.89	*
Bank (L.F.)	1,520	1,520	2,350
	Alt. IV	Alt. IV(a)	Alt. IV & IV(a)
BVW & LUW (Acres)	7.74	7.29	11.2
LSF (Acres)	1.47	1.47	*
Bank (L.F.)	1,610	1,610	3,590

* Calculations for Land Subject to Flooding (LSF) were not included since portions of the Bordering Vegetated Wetland replacement acreage will function as flood storage areas and Land Subject to Flooding.

The proposed wetland replacement areas comply with criteria and standards of the Act except where such criteria would not be feasible due to physical or environmental constraints. Where possible, replacement areas have been located within the same drainage basin as the areas to be impacted, as well as within the highway right of way. The criteria and standards of the Act are presented in the Technical Addendum.

The following is a description of the six conceptual wetland replacement areas relative to the standards of the Act. A general description and locational information have been previously described for these areas in Section VI.G.1.

Area A will consist of approximately 6 acres of Bordering Vegetated Wetlands. This Area will be excavated to the interface of groundwater to facilitate a saturated environment. Plantings in this area will be shrubs and saplings indigenous to the area. Typical species are red maple, arrowwood viburnum, dogwoods, and highbush blueberry. Plants will be selected and arranged so that after two years, a 75% coverage is anticipated.

A meandering channel about 900 feet in length is also proposed for this Area. This channel will provide for replication of Land Under Water as well as naturally creating bank and edge environments. The bank areas will provide escape cover, breeding habitat, and food resources for terrestrial, amphibian and aquatic wildlife. In addition to performing important wildlife functions, replication Area A will protect other interests of the Act. The natural filtering ability which enables wetlands to trap sediments and contaminants will prevent pollution of surface and groundwater resources. Furthermore, this area will also provide flood storage volume and will replicate floodplain areas lost.

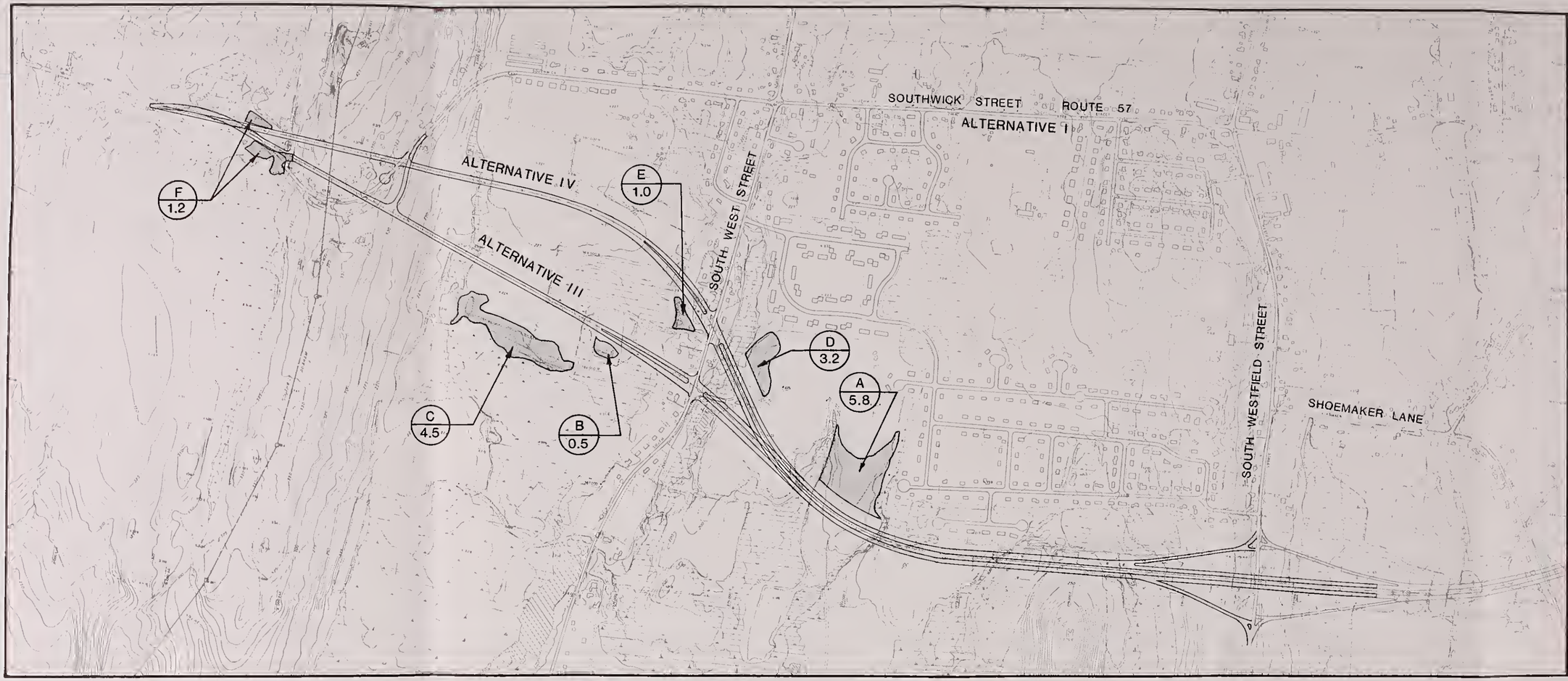
Area B is a Bordering Vegetated Wetland area approximately 0.5 acres in size. This area will be hydraulically connected to Wetland Areas #5 and #6. Plantings will consist of saplings, shrubs and ground covers identified in the Act and those indigenous to the adjacent swamp area. This vegetational community will provide for the protection of interests identified in the Act. Such interests include ground water supply, storm flood control and flood damage prevention, prevention of pollution and protection of fisheries. This area will be planted with species that will provide food and cover for wildlife, replacing the existing ornamental shrubs which exhibit a low wildlife value.

Area C will consist of Bordering Vegetated Wetlands, Land Under Water and Bank. The existing irrigation pond will be expanded to include Land Under Water and Bank, providing wildlife habitat for the area during breeding, wintering and migration periods. The bank and waterbody will be planted with indigenous species high in wildlife value. The remainder of the site will consist of Bordering Vegetated Wetlands. This Area will connect to the adjacent Wetland Area #8. This replacement will act as a flood storage area. It will be designed to protect the interests of ground water supply, pollution prevention, storm flood control and damage prevention, and protection of fisheries.

Area D will consist of over 3 acres of Bordering Vegetated Wetland. This area will be excavated to the elevation of the adjacent wetlands and planted with shrubs and saplings indigenous to the area. Species to be included are dogwoods, willows, and red maples. In addition, about 0.1 acres of Land Under Water will be replaced with a meandering channel. This channel will also provide replacement bank environment for wildlife breeding habitat, food and cover, escape areas and food supply for wildlife and fisheries. The channel will also be designed to divert and retain storm water flows into the replicated wetland area. Area D will also replicate Land Subject to Flooding and provide flood storage. These functions will enable the replacement area to carry out other interests outlined in the Act such as flood control, flood damage prevention and prevention of pollution.

Area E will replace Land Under Water, Bank and Bordering Vegetated Wetlands lost as a result of the proposed project. A water body and associated bank will be created to provide food and shelter for water fowl during migratory and overwintering periods. The plant community and structure of the replacement area may also act as a breeding site for amphibians and reptiles found in the area. This replacement area will enhance the adjacent Bordering Vegetated Wetland Area #4 by enlarging the overall size and creating a water body and wet meadow/swamp area. This area is likely to be significant to ground water supply, flood control and storm damage prevention, and wildlife. In conjunction with the adjacent BVW, it is anticipated that the wetland is significant to the interest of prevention of pollution by retaining nutrients and toxic substances associated with the adjacent highway, nearby roadway and nursery operation.

Area F will consist of Land Under Water, Bank, Land Subject to Flooding and Bordering Vegetated Wetlands. The existing Route 57 culvert will be removed and replaced by a natural channel, providing Land Under Water and associated Bank. The Land Under Water will consist of organic and mineral soils excavated from wetland impact areas. Adjacent to these resource areas will be Bordering Vegetated Wetlands, also functioning as Land Subject to Flooding. Wetland species will be planted to provide a swamp environment which will perform various functions and interests identified in the Act. Such interests include storm flood control and damage prevention, and protection of fisheries. The vegetational community will remove sediments and nutrients associated with the relocated highway and adjacent farm field, providing a setting which will perform the wetland interest of prevention of pollution. The resource areas will have the capacity to provide habitat and food for wildlife during migratory, overwintering and breeding seasons.



COMMONWEALTH OF MASSACHUSETTS
DEPARTMENT OF PUBLIC WORKS

ROUTE 57 RELOCATION

CONCEPTUAL REPLACEMENT WETLAND AREAS

KEY

(X / #)

X-AREA DESIGNATION

#-SIZE (ACRES) WETLAND REPLACEMENT AREAS

N

0 600 1200

HOR. SCALE IN FEET

FIG. NO. VI-1

H. LAND USE AND SOCIOECONOMIC

The proposed project is not expected to result in any measurable areawide or intercommunity impacts on land use within the study area.

To ensure continuity of the Metacomet-Monadnock Hiking Trail along Provin Mountain at the Agawam/Southwick Town Line, proposed mitigation measures will include a short relocation of the Trail along reconstructed Southwick Street (Existing Route 57). The construction contract documents for the proposed project will provide an expanded grassed walk area for hikers along reconstructed Southwick Street along with adequate safety and directional signage.

I. RELOCATION

The housing market analysis in the study area indicates that adequate housing resources are available to facilitate relocation of the residents that would be taken for any of the Build Alternatives.

Relocations of occupied properties will be accomplished in accordance with the Surface Transportation and Uniform Relocation Assistance Act of 1987 (P.L. 100-17). This will ensure the equitable treatment of those individuals and businesses impacted by relocation.

J. FARMLANDS

It may prove feasible to mitigate the adverse effects of conversion of farmlands by effectively reducing the right of way taking width or leasing back land within the normal 300 foot wide right of way where the highway passes through farms.

The feasibility and extent for these reductions in right of way width will be more fully evaluated during the subsequent design phase for the Route 57 Relocation project. Based on the location of the required toe of slope and proposed drainage facilities, it may be possible to reduce the required right of way width on either side within the Boglish Farm and within the Tuckahoe Turf Farm. Whether to vary from the policy of acquiring a standard 300 foot right of way width will be an issue to be resolved by the MHD and other review agencies.

K. AIR QUALITY

Exceedance of the National Ambient Air Quality Standards is not anticipated, therefore no project specific long term air quality abatement measures are proposed.

The mesoscale analysis shows no mitigating measures are necessary since future NMHC emissions will decrease in comparison to emissions under Alternative I (No Build). For Alternatives III(a) and IV(a), NHMC will decrease from the 1988 Existing Conditions Case, but will be higher than the Future No Build Case (Alternative I).

The microscale analysis also shows that no mitigating measures are necessary since all 1-hour and 8-hour CO concentrations are in compliance with NAAQS in 1993 and in 2013 for Alternatives III, III(a), IV and IV(a). In fact, the proposed project serves as a mitigation measure as compared to existing air quality levels.

The construction of the Route 57 Relocation Project will generate some temporary air quality impacts to the adjacent community from fugitive dust. As required by DEP Air Pollution Control Regulation 7.09, dust will be controlled during construction as needed by application of water or calcium chloride to exposed areas. All trucks and earth stockpilers will use tarp covers.[1] Following construction, the use of asphalt pavement and permanent landscaping will cover exposed soil and adequately control fugitive dust emissions.

L. NOISE

The Federal Highway Administration (FHWA) prescribes six noise abatement measures which are to be considered when FHWA highway noise criteria are exceeded or when future highway sound levels exceed existing levels by a substantial amount, i.e. 15 dBA. These noise abatement measures are as follows:

- Traffic management measures such as prohibition of certain vehicle types, time-use restrictions for certain vehicle types, modified speed limits, and exclusive land designations.

- Alteration of horizontal and vertical alignments.

- Acquisition of property rights (either in fee or lesser interest) for construction of noise barriers.

- Construction of noise barriers (including landscaping for aesthetic purposes) whether within or outside the highway right-of-way.

- Acquisition of real property or interests therein (predominantly unimproved property) to serve as a buffer zone to preempt development which would be adversely impacted by traffic noise. This measure may be included in projects only involving new construction or major reconstruction.

- Noise insulation of public use or nonprofit institutional structures.

Under any of the Build Alternatives, exterior noise levels at all studied locations within the project area will remain below the FHWA exterior noise standard for Category B (67 dBA).

However, at Locations 2 and 9 in the Hendom Heights neighborhood of Agawam, the Build Alternatives will result in sound level increases of slightly more than 15 dBA over existing conditions.

Since Locations 2 and 9 are located close together, the construction of a single highway noise barrier serving both locations was evaluated using the FHWA STAMINA2/OPTIMA computer model.

[1] 310 Code of Massachusetts Regulations 7.09(3), Dust, Odor, Construction and Demolition.

The following Table VI-4 summarizes the results of the detailed analysis conducted for noise barriers for the Build Alternatives which is contained in the Technical Appendix.

TABLE VI-4

HIGHWAY NOISE BARRIER AT HENDOM HEIGHTS SUBDIVISION

	Alt. III & Alt. IV	Alt. III(a) & Alt. IV(a)
Total Barrier Length (ft)	2,790	2,790
Total Barrier Area (sf)	40,940	40,940
Estimated Constr. Cost	$920,300	$920,300
Average Cost/Residence/ dBA Reduction	$ 5,040	$ 5,480
Average Noise Reduction per Residence	7.0 dBA	6.5 dBA
Maximum Allowable Expenditure/ Residence/dBA per MHD Guidelines	$ 2,400	$ 2,400

The noise barrier analysis indicates that the costs for barriers under all Build Alternatives far exceed the MHD maximum allowable expenditure guideline of $2,400 per dBA per residence. Accordingly, provision of a noise barrier in the Hendom Heights neighborhood is not considered cost effective and is not proposed for this project.

Other highway noise mitigation techniques discussed in FHPM 7-7-3 such as traffic management, alignment modifications or property acquisition are not considered feasible.

Noise from construction equipment will impact surrounding locations. Nearly all of the affected properties are residential.

Noise control mitigating measures during construction will include the following:

- Restrict construction activities to 7:00 AM to 7:00 PM.
- Locate equipment storage and staging areas away from residential property.
- All construction equipment will have properly installed and maintained exhausts and other noise suppression devices.

THIS PAGE INTENTIONALLY LEFT BLANK

VII. LIST OF PREPARERS

Federal Highway Administration

Arthur O'Connor, Assistant Area Engineer

Massachusetts Highway Department

Gregory Prendergast, Deputy Chief Engineer for Project Development

Thomas R. Hession, Associate Environmental Engineer, Project Manager

Beatrice B. Reynolds, Air and Noise Specialist

Storch Engineers

Joseph F. Libuda, P.E., Partner-in-Charge

Thomas C. Houston, A.I.C.P., P.E., Project Manager

Cavanaugh Tocci Associates (Noise)

Gregory C. Tocci, P.E.

Tech Environmental, Inc. (Air Quality)

Peter H. Guldberg, C.C.M.

University of Massachusetts at Amherst (Historical and Archaeological)

Mitchell T. Mulholland, Ph.D.

THIS PAGE INTENTIONALLY LEFT BLANK

VIII. CIRCULATION

The following is a list of agencies, organizations and persons to whom the EA/SEIR is sent.

A. Federal Government

Senators:

Edward M. Kennedy
John F. Kerry

Congressman:

Richard E. Neal (Agawam)
John W. Olver (Southwick)

Department of the Army, Corps of Engineers, New England Division

Department of Transportation, Federal Highway Administration

Department of Housing and Urban Development

Department of the Interior, Fish and Wildlife Service, New England Division

Environmental Protection Agency

Air Management Division
Regional Administrator
Wetland Management Division
Environmental Review Coordinator

B. State Government and Regional Agencies

Senators:

Linda J. Melconian, Agawam
Shannon P. O'Brien, Southwick

Representatives:

Michael P. Walsh, Agawam/Southwick

Office of the Governor

Executive Office of Environmental Affairs

Executive Office of Public Safety

Department of Environmental Management

Massachusetts Department of Fisheries
Massachusetts Natural Heritage Program

Department of Food and Agriculture, Division of Land Use

B. **State Government and Regional Agencies** (Continued)

Massachusetts Historical Commission

State Archaeologist

Joint Legislative Commission on Transportation

State Clearinghouse

Department of Environmental Protection

Division of Air and Hazardous Materials
Division of Wetlands Protection
Division of Waterways, Licenses and Permits
Division of Water Pollution Control
Division of Water Supply

C. **Municipal Agencies and Local Citizen Organizations**

Town of Agawam

Chairperson, Board of Selectmen
Chairperson, Conservation Commission
Director, Parks and Recreation
Chairperson, Planning Board
Fire Chief
Police Chief
Chairperson, Historical Commission
Town Clerk
Town Engineer
Town Library

Town of Southwick

Chairperson, Board of Selectmen
Chairperson, Conservation Commission
Director, Parks and Recreation
Chairperson, Planning Board
Fire Chief
Police Chief
Chairperson, Historical Commission
Town Clerk
Town Engineer
Town Library

D. **Other Interested Organizations**

Pioneer Valley Planning Commission

Berkshire Appalachian Mountain Trails Committee

E. **Other Interested Individuals**

Muriel M. White and J. Craig White

APPENDIX 1.

WETLANDS

SECTION A

SUMMARY OF WETLAND DELINEATION METHODOLOGY

WETLAND DELINEATION TRANSECT MAPS (ALT. III & IV)

The wetland areas were delineated using both State and Federal criteria, in accordance with the Massachusetts Wetland Protection Act and the Federal Manual for Identifying and Delineating Jurisdictional Wetlands.

Federal Interagency Approach

The wetland delineation was performed according to the methods prescribed in the Federal Manual for Identifying and Delineating Jurisdictional Wetlands. The Federal multiparameter approach, and implementing rules and regulations of the Section 404 permit program require positive indications for all three criteria (hydrophytic vegetation, hydric soils and wetland hydrology) for an area to be considered a wetland.

A baseline was established parallel to the dominant hydrologic feature (e.g. stream, pond) within the study area. Transects were established perpendicular to the baseline. Observation points were established along each transect, each within a particular cover type observed in the area or at a suspected wetland/non-wetland boundary (See Figures 1.1.a. and b., Transect Maps for Alternatives III and IV).

Three measurements were made at each observation point. They are:

A. An identification and quantification of all herbaceous vegetation species within a five foot radius; and for sapling, shrub, woody vine, and tree species within a 30 foot radius of the observation point. Dominance for herbs, saplings and shrubs, was determined by percent areal cover, for trees by relative basal area and for woody vines by relative stem density. An area has hydrophytic vegetation when, under normal circumstances, more than 50% of the composition of the dominant species from all strata are obligate, facultative wetland and/or facultative species.

B. An identification of soil chroma at a point immediately below the A-horizon or a ten inch depth, whichever is shallower. Gleyed soils, and soil chroma of 1 or less for unmottled and 2 or less for mottled soils, as determined by comparison to a Munsell soil color chart is indicative of hydric soils.

C. An identification of indicators of wetland hydrology, namely the presence of standing water, or saturated soil to within twelve inches of the ground surface during all or a portion of the growing season. For those instances where standing water or saturated soils are not within twelve inches of the surface, seasonal high water table information from the Soil Conservation Service and other hydrology indicators (i.e., drift lines, water stained leaves, wetland drainage patterns, water borne sediment deposits, morpholigical plant adaptations) are used as indicators of wetland hydrology.

Data sheets documenting vegetation, soil characteristics and hydrology for each observation point along transects are on file at the Massachusetts Highway Department.

Massachusetts Wetland Protection Act

Under the Massachusetts Wetland Protection Act, the Commonwealth of Massachusetts regulates four separate resource areas. These resource areas include:

- Banks (Naturally occurring Banks and Beaches)
- Bordering Vegetated Wetlands (Wet Meadows, Marshes, Swamps and Bogs)
- Land Under Water Bodies and Waterways (Under any Creek, River, Stream, Pond or Lake)
- Land Subject to Flooding (Bordering and Isolated Areas)

Each of these areas, when encountered within the limits of the study area, were identified and delineated.

This Act defines a bank as "the portion of the land surface which normally abuts and confines a water body. It occurs between a water body and a vegetated bordering wetland and adjacent flood plain, or, in the absence of these, it occurs between a water body and an upland. A Bank may be partially or totally vegetated, or it may be comprised of exposed soil, gravel or stone". Areas within the project scope meeting this definition were delineated and quantified in linear feet. The linear extent of bank resource areas to be impacted by the project was determined from topographical plan sheets, and field inspection.

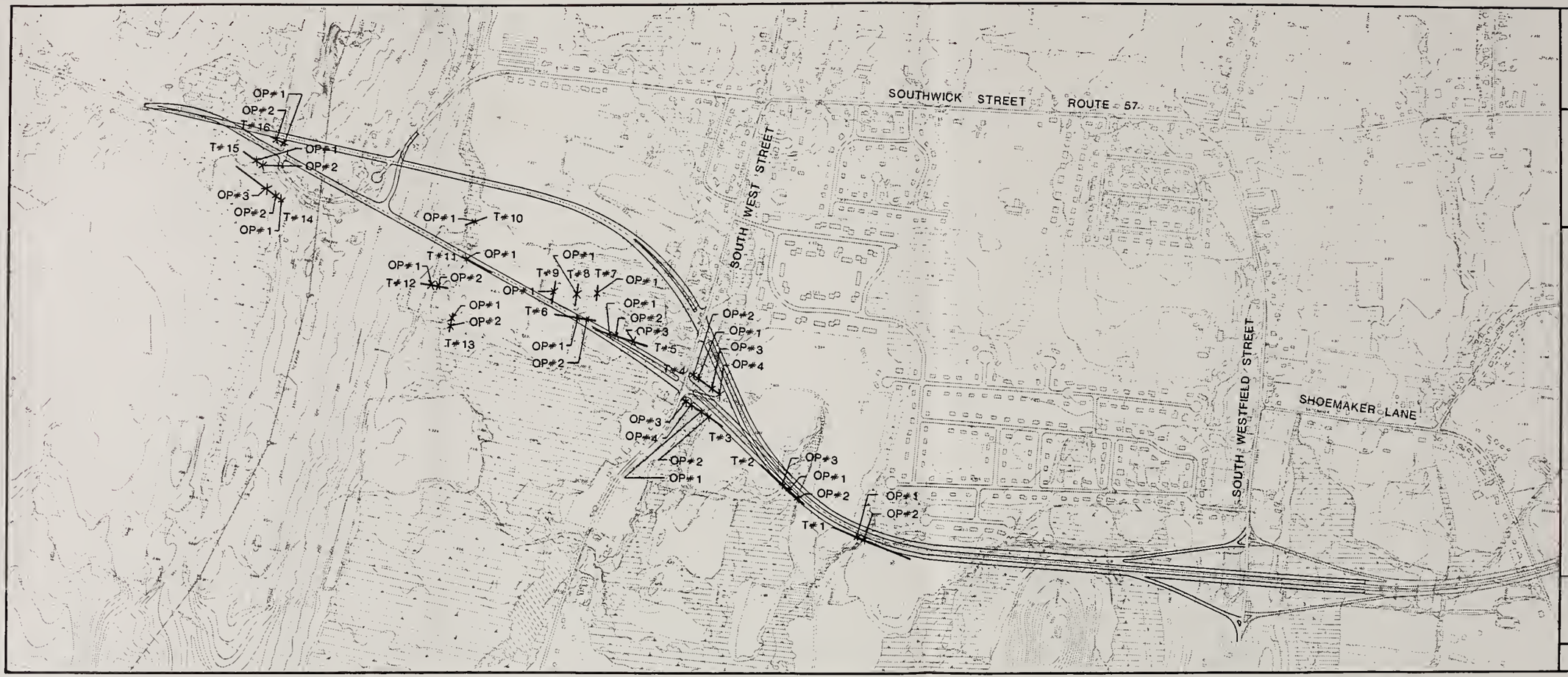
The Act defines Bordering Vegetated Wetlands (BVW) as "freshwater wetlands which border on creeks, rivers, streams, ponds and lakes. The types of freshwater wetlands are wet meadows, marshes, swamps and bogs. They are areas where the topography is low and flat, and where the soils are annually saturated. The boundary of Bordering Vegetated Wetlands is the line within which 50 percent or more of the vegetational community consists of wetland plan species".

Wetland plant species were identified as those which were listed in the publication entitled entitled Guide to Inland Vegetated Wetlands in Massachusetts, and the National List of Plant Species that occur in wetlands.

Assessments of the vegetational communities were made using a modified quadrat sampling methodology. Relative abundance of species was calculated for tree, shrub and herbaceous strata within the vegetational community. Dominant species within each strata were identified as either typical of wetlands or uplands using the above referenced source and were tallied to calculate percent of vegetational community.

The Act defines Land Under Water Bodies and Waterways as "the land beneath any creek, river, stream, pond or lake. Said land may be composed of organic muck or peat, fine sediments, rocks or bedrock". Land under water was delineated and surveyed for areas within this alignments which met the criteria.

The resource area defined as bordering land subject to flooding is an area which floods from a rise in a bordering waterway or waterbody. These areas have been identified as areas within the 100 year flood plain, and are mapped for the study area.



COMMONWEALTH OF MASSACHUSETTS
DEPARTMENT OF PUBLIC WORKS

ROUTE 57 RELOCATION

WETLAND DELINEATION TRANSECTS FOR ALTERNATIVE III

LEGEND

T-TRANSECT

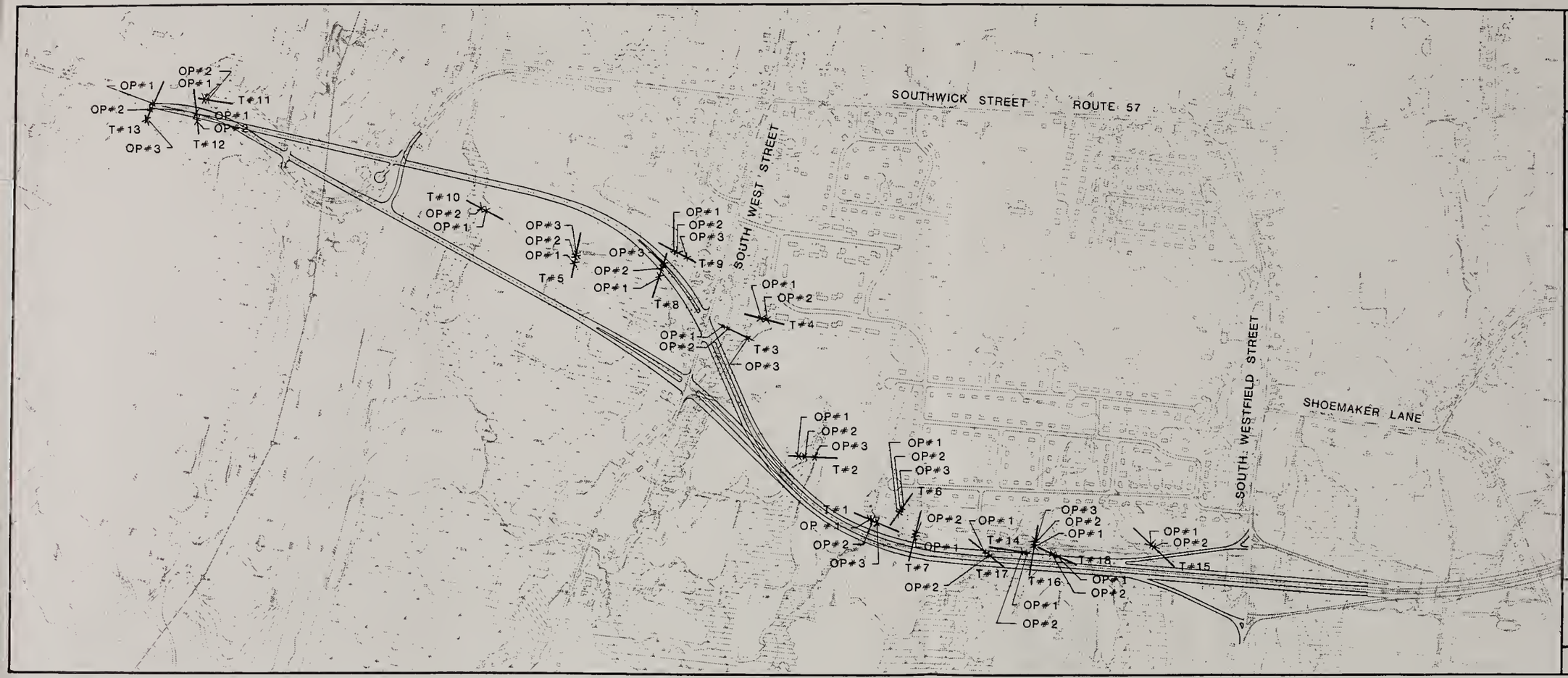
OP-OBSERVATION POINT

N

0 600 1200

HOR. SCALE IN FEET

FIG. NO.1.1.A



COMMONWEALTH OF MASSACHUSETTS
DEPARTMENT OF PUBLIC WORKS

ROUTE 57 RELOCATION

WETLAND DELINEATION TRANSECTS FOR ALTERNATIVE IV

LEGEND

T-TRANSECT

OP-OBSERVATION POINT

N

0 600 1200

HOR. SCALE IN FEET

FIG. NO. 1.1.B

SECTION B

REVIEW OF WETLAND INFORMATION

SURFICIAL GEOLOGY MAP

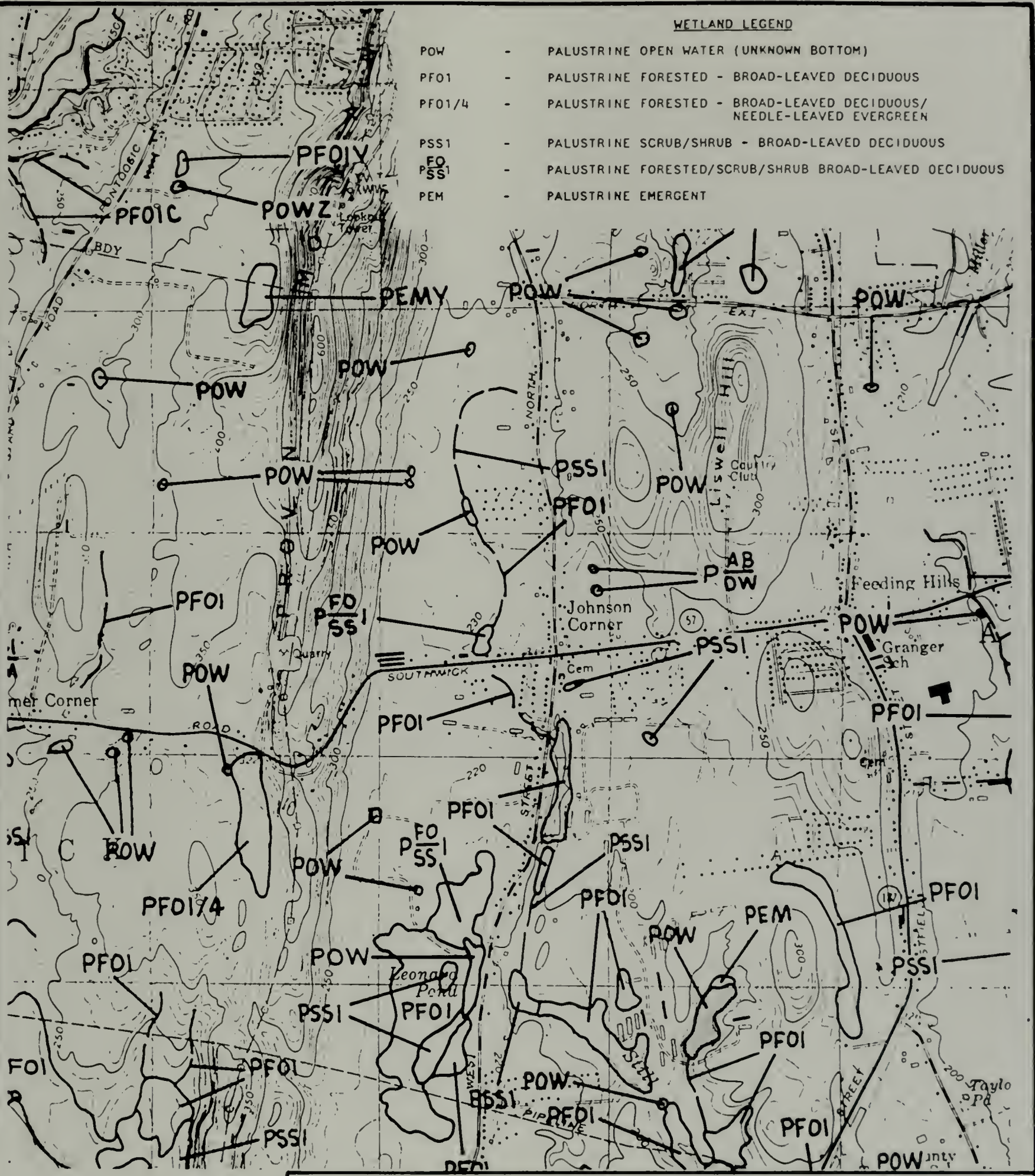
NATIONAL WETLAND INVENTORY MAP

Examination of data from the United States Geologic Survey (USGS) and United States Fish and Wildlife Service's National Wetland Inventory (NWI) West Springfield, MA and CT quadrangle maps; and the US Soil Conservations Service (SCS) Soil Survey of Hampden County, MA indicate that the study area possesses wetland characteristics. The existing wetland resources in the study area are shown on Figure IV-2 in the Report.

The USGS mapping (Figure 1.2) shows Still Brook and the two unnamed tributaries and the unnamed stream west of Provin Mountain as permanent water features. The NWI map (Figure 1.3) identifies palustrine, forested broad-leaved deciduous wetlands in Wetland Area #3, and shows the tree farm pond as palustrine, open water in Wetland Area #7. The portion south of existing Route 57, within wetland area #9, is identified as palustrine, forested broad-leaved, deciduous/needle-leaved evergreen wetlands.

The SCS Soil Survey for Hampden County identifies soils within the wetland areas as Amostown fine sandy loam, Wareham loamy sand, Enosburg sandy loam, Scantic Variant silt loam, Saco Variant silt loam, Scarboro fine sandy loam, Raynham silt loam, Ridgeburg sandy loam, Limerick silt loam, and Woodbridge fine sandy loam. In addition to these soils, several wetland areas are mapped as "muck, shallow". These soil types appear on the list of Hydric Soils of New England and Hydric Soils of the State of Massachusetts.

Qs
Swamp deposits
Grayish-brown to black peat, muck, silt, sand, and clay Generally 5-10 feet thick, but may be as much as 25 feet thick
SOURCE: US DOI
W. Springfield
Quad Map
COMMONWEALTH OF MASSACHUSETTS
DEPARTMENT OF PUBLIC WORKS
ROUTE 57 RELOCATION
SURFICIAL GEOLOGY MAP
PROJECT NO: 6470
SCALE: N.T.S.
DATE:
Figure 1.2
Johnson Corner
Feeding Hills
Granger Sch
Leonard Pond
Shea Corner
Rising Corner
Stony Knoll
County Training Sch
SOUTHWICK
STREET
BARRY
PIPELINE
HAMPDEN CO
HARTFORD CO
Qt
Qs
Qo
Qal
Qd
Qgf
Ql
Trb
Trs
Trst
af



SOURCE: U.S. DEPT. OF THE INTERIOR WEST SPRINGFIELD, MASS.-CONN.

COMMONWEALTH OF MASSACHUSETTS
DEPARTMENT OF PUBLIC WORKS
ROUTE 57 RELOCATION

NATIONAL WETLAND INVENTORY MAP

PROJECT NO: 6470

SCALE: N.T.S.

DATE:

Figure 1.3

SECTION C

WETLAND DESCRIPTIONS AND CLASSIFICATIONS

Wetland areas were identified within the study area and delineated using USACE and Massachusetts WPA criteria. (See Figure IV-2 in the Report) Wetland boundaries were flagged in the field and surveyed and wetland data forms were used to record the field data.

Federal Descriptions and Classifications

The fifteen wetland areas identified within the study area all belong to an ecological system referred to as Palustrine. Generally, a palustrine system includes all nontidal wetlands ranging widely in diversity from open water to forested areas. This system was developed by the U.S. Fish and Wildlife Service to group vegetated wetlands traditionally called marsh, swamp, bog, fen and prairie. It also includes the small, shallow, permanent or intermittent water bodies often called ponds.

A. Wetland Area #1 is located where Alternative II and III divide, west of Route 187 and within the Tuckahoe Turf Farm property. This area consists of palustrine, forested, broad-leaved deciduous wetlands. Within the wetland area is an unnamed tributary to Still Brook, flowing in a southerly direction. The canopy species include musclewood, sugar and red maple, black willow, American elm and green ash. The understory was dominated by arrowwood viburnum and American elm saplings. Ground cover consists of jewelweed, cinnamon fern, false nettle, mosses and violets. The wetland area within the proposed Alignment III right of way is confined between the somewhat steeply sloping banks to the east and west. The stream associated with this appears to be permanently flooded.

   As the stream flows in a southerly direction the banks become less defined and the width of the wetland area becomes greater. South of Alternative II, the stream is piped under a roadway within the turf farm.

   The SCS identifies Limerick silt loam within these areas. Flooding is frequent, for brief periods from January to June. This soil appears on the List of Hydric Soils of New England and Massachusetts.

B. Wetland Area #2 is located within turf farm property, west of area #1 and is bounded by a dirt roadway to the east. An unnamed tributary of Still Brook flows through this area in a south-westerly direction. This stream appears to be above the head-waters and has a poorly formed channel. The area consists of a palustrine forested and emergent wetlands. The dominant vegetation within the forested wetland area consists of an overstory of red maple, grapevine; and yellow birch, with an understory of raspberry, arrowwood virburnum, silky dogwood and musclewood. Ground cover consists of lady fern, cinnamon fern and sensitive fern. The emergent vegetation adjacent to the stream area consists of common cattail and jewelweed.

Where proposed Alternative II would transect this area, canopy species include yellow birch, black birch, white ash and red maple. Understory species include highbush blueberry, winterberry, spicebush, birch and beech saplings, arrowood viburnum and silky dogwood. Dominant ground cover consists of sensitive ferns with dewberry and sphagnum moss present.

Soils were saturated to the surface at the time of field investigations. The SCS identified Scantic Variant Silt Loam within this area. A perched water table is at or near the surface from October to June. This soil appears on the List of Hydric Soils of New England and Massachusetts.

C. Wetland Area #3 is located east of South West Street, north and south of the turf farm driveway and west of Area #2. An unnamed tributary to Still Brook flows through this wetland in a southerly direction. This stream is piped under the driveway through two 60" reinforced concrete pipes. A pond has been constructed just south of this driveway and is used for irrigation purposes. The topography of the area is steeply sloping to the stream. The wetland boundary corresponds closely to the toe of slope.

The wetland is classified as a palustrine, forested, broad-leaved deciduous and palustrine emergent wetland. The forested wetland area south of the roadway consists of an overstory of grey birch, American elm and red maple with silky dogwood, black willow saplings and jewelweed as dominant understory species. Ground cover species include sensitive fern, common cattail, sedge and lance leaved goldenrod. The area north of the turf farm road consists of forested wetlands with an emergent area adjacent and parallel to the stream. The forested area is similar to the southern wetland area. The emergent area is dominated by arrow-leaved tear thumb, jewelweed and juncus. The wetland area is semipermanently flooded.

Near the southern extent of Area #3 where Alternative II would impact, the community is also classified as palustrine, forested, broad-leafed deciduous wetland system. The forested area is dominated by American elm, with red maple and black willow present. The understory is dominated by red panacle dogwood, with a herbaceous cover consisting of skunk cabbage, sensitive fern and turtlehead.

The SCS identifies Saco variant silt loam within these wetland areas. Flooding occurs frequently, for brief durations during the period of October to May. The seasonal high water table is above or slightly below the surface from December to June. This soil is on the List of Hydric Soils of New England and Massachusetts.

D. Wetland Areas #4, 5, and 6 are located west of South West Street and are within the Boglisch Tree Farm property and are part of the Leonard Pond wetland system. Several intermittent and permanent streams are within these wetlands, feeding to Leonard Pond. A dirt road bisects Wetland Area #4 from Areas #5 and #6. These areas are classified as palustrine, forested, broad-leaved deciduous wetland. The canopy is dense, consisting of red maple, green ash, black cherry, swamp white oak and pin oak. The understory consists of highbush blueberry, chokeberry, arrowood viburnum, spicebush and green ash saplings. The ground cover consists of a mixture of cinnamon, sensitive and royal fern, jewelweed, false nettle and canada mayflower.

The SCS soil survey identifies Enosburg sandy loam within these wetland areas. Seasonal high water is at or near the surface from November to May. This soil appears on the list of Hydric Soils of New England and of Massachusetts.

E. Wetland Area #7 is also part of the Leonard Pond Wetland System. It is located east of Provin Mountain and west of Wetland Areas #4, #5, and #6, within the Boglisch Tree Farm property. This wetland area parallels an unnamed stream which flows to Leonard Pond. Land adjacent to this area is actively farmed.

The SCS soil survey identifies "muck, shallow" within this area which consists of organic material. Flooding is frequent for very long durations for the months of November to June. The seasonal high water table is a foot above or just below the surface from September to June. During field investigations soil was saturated to the surface with areas of inundation. During soil sampling a sulfidic odor was noted. This odor is usually detected in waterlogged soils that are permanently saturated and have sulfuric material within a few centimeters of the soil surface. (USACE - Technical Report Y-1-87)

The stream associated with Wetland Area #7 flows to a small pond south of Alternative III. This pond appears to be man made. This area is classified as a palustrine emergent and palustrine open water wetlands. Wetland vegetation adjacent to the ponding area consists of burreed, juncus sp. and grasses. The pond has a thick layer of lesser and greater duckweed present. The wetland area north of this pond consists of palustrine, forested, broad-leaved deciduous wetlands with palustrine emergent wetlands adjacent to the stream. Black and grey birch, common cottonwood and red maple overstory were present in the forested wetland area. The understory consists of highbush blueberry, multiflora rose with red maple and birch saplings. Ground cover present consists of false nettle, common cattail, lady fern, jewelweed, skunk cabbage, swamp beggers tick, sensitive and cinnamon fern. The dominant vegetation in the emergent area is common cattail. This area is a semipermanently flooded wetland.

F. Wetland Area #8 is hydraulically connected to Areas #4, 5, 6, and 7 and is part of the Leonard Pond wetland system. A dirt roadway bisects Area #7 and #8. Water passes as an intermittent stream in this area below the dirt roadway from the ponding area to the north. This stream drains to another irrigation pond east of Spears Farm. This area consists of palustrine, forested, broad-leaved deciduous and palustrine open water wetlands. The dominant tree species in this area are red maple, American elm, agrey and black birch. The understory was sparce, including silky dogwood, arrowood viburnum, and grey and black birch. The ground cover consists of sphagnum moss, horsetail, jack-in-the-pulpit, Massachusetts fern and skunk cabbage.

Tree species in this area exhibit morphological adaptions typical for these species in areas having anaerobic soil conditions. Buttressed and fluted tree trunks and multitrunks were noted in this wetland area. These morphological adaptions are a response to frequent inundation.

The SCS identifies, "muck, shallow" in this area. The seasonal high water table is a foot above or just below the surface from September to June.

G. Wetland Area #9 is located north and south of the existing Route 57 in the Town of Southwick. An unnamed stream flows through this wetland area to Leonard Pond with a portion of the stream piped below existing Route 57.

Palustrine, forested, broad-leaved deciduous wetlands parallel the aforementioned stream, north of existing Route 57. The stream channel north of the existing highway is well defined and wetland boundary follows the toe of the slope.

The stream south of the existing highway has a poorly formed channel with several ground water discharges present. This wetland area drains in a southerly direction to Leonard Pond. The USGS mapping indicates that this stream is a permanent water feature. Ponding was present adjacent to the stream. Palustrine, forested, broad-leaved deciduous wetlands are present with a small pocket of palustrine emergent wetlands in the northwestern portion, just east of the existing residence. The water regime of the wetland area is semipermanently flooded.

Tree species present in the forested wetland area consists of red maple, eastern hemlock, American elm and grey birch. The under-story was dense in areas, consisting of arrowood viburnum, winterberry, elderberry, jewelweed with elm and maple saplings. Ground cover consists of a mixture of sensitive, royal and cinnamon fern, skunk cabbage, turtlehead, goldenrod sp., New England aster and sedge hummocks.

It appears that the emergent wetland area was historically farmed and now consists of herbacious hydrophytic vegetation. A drainage ditch was constructed in this field area, in a north-south direction. Species present include boneset, soft rush, sedge species, common cinquefoil, goldenrod species, and Queen Anne's Lace.

The SCS identifies Scarboro fine sandy loam within this area. The seasonal high water table is a foot above or just below the surface from January to December. This soil appears on the list of Hydric Soils of New England and Massachusetts.

H. Wetland Area #10 consists mostly of palustrine, forested, broad-leafed deciduous wetlands with a palustrine emergent wetland present. Both areas are located within the eastern portion of the turf farm property. A small unnamed stream flows through this area in a southerly direction and is piped under a dirt roadway just north of the alignment. A ditch and several intermittent ponding areas drain to the stream. Seasonal ponding and water was at or above the surface during the time of the field investigations.

Trees present in this area are American elm, red maple, grey birch, red oak, and yellow birch. Highbush blueberry is dominant in the understory with nannyberry, spicebush, arrowwood and winterberry also present. Herbaceous cover consisted of sensitive fern, sphagnum moss and several species of grass.

The emergent area present consists of juncus and carex species with red clover and grasses also present. It appears that this area was once farmed and recently has been left fallow.

The SCS identifies the soil of this area as Limerick silt loam. Limerick soils are nearly level, deep, and poorly drained soils found on floodplain and formed in medium textured alluvium. The seasonal high water table is ½ to 1½ feet below the surface from January to June. This soil is on the List of Hydric Soils for Massachusetts and New England.

I. Wetland Area #11 is composed of three classes of the palustrine system: forested, broad-leafed deciduous; emergent; and open water. It is located east of Area 10 north and south of the dirt road leading from the turf farm.

In the palustrine, forested, broad-leafed deciduous area, red maple and American elm are the dominant tree species with grey birch, white pine, beech and pin oak also present. In the understory highbush blueberry is dominant, with arrowood viburnum and spicebush also present. Herbaceous cover consists of jewelweed, sedges, sensitive fern, sphagnum moss, and marginal wood fern. Local ponding is apparent in this area.

The palustrine emergent area is used currently as cow pasture. Many herbaceous species were noted including juncus, blue flag, horehound, true forget me not, bulbous buttercup, woolgrass, asters, multiflora rose, sedge hummocks, boneset, and silky dogwood.

A small constructed irrigation pond located within the emergent field constitutes the palustrine, open water area. Area #11 is hydraulically connected to Area #10 through surface flow and some constructed ditches.

The soils of Area #11 are classified as Wareham loamy sand by SCS. These soils are rapidly permeable, deep, and poorly drained soils found in depressions and drainageways, on sandy glacial outwash. The seasonal high water table is at the surface to 1½ feet below the surface from September to June. This soil is on the List of Hydric Soils for both Massachusetts and New England.

J. Wetland Area #12 is located north of the existing Route 57, at the westernmost extent of the project in Southwick. This area is classified as a palustrine, forested, broad-leaved deciduous wetland typified by red maple, grey birch saplings in the overstory, cinnamon fern and highbush blueberry found in the understory, with canada mayflower also notably present. Included in this forested wetland is a small emergent area with tussock sedge hummocks present. Flow from this area is to the south, through a culvert under existing Route 57.

Soils in this area are classified as Scarboro fine sandy loam. Permeability in these soils are rapid or very rapid and have an apparent high water table at 0 - 1.0 foot from the surface during October to May. This soil is on the List of Hydric Soils of Massachusetts and New England.

K. Wetland Area #13 is located south of the existing Route 57 in Southwick, directly across from Wetland Area #13. The vegetational community is defined as palustrine, forested, broad-leaved deciduous wetland, vegetated with red maple, American elm, highbush blueberry, winterberry, skunk cabbage, cinnamon fern, sedge hummonks and sphagnum moss.

This area is hydraulically connected to Area #12 via a culvert under existing Route 57. Direction of surface water flow in this area is to the southeast, discharging to the mapped palustrine open water area adjacent to Area #9, and eventually to Leonards Pond.

Soils in Wetland Area #13 are mapped as Scarboro fine sandy loam. Permeability in these soils is rapid or very rapid and has an apparent high water table at 0 - 1.0 foot from the surface from October to May. This soil is on both the List of Hydric Soils of Massachusetts and New England.

L. Wetland Area #14 is a small palustrine, forested, wetland. It is located adjacent to Wetland #13, separated by a driveway to a residence. The wetland is bounded by steep slopes, Route 57 westbound and residences. Typical vegetation within this area is red maple, American elm, hemlock, highbush blueberry, arrowood, skunk cabbage, cinnamon fern and shagnum moss.

Surface water appears to originate within the wetland area and flow in a westerly direction to a culvert.

Soils in this area are also mapped as Scarboro fine sandy loam, with an apparent high water table at 0 - 1.0 foot from the surface from October to July. This soil is on the List of Hydric Soils of Massachusetts and New England.

M. Wetland Area #15 is located at the terminus of the approved Phase I Section of Route 57, east of South Westfield Street. This area is part of a larger wetland complex which extends from Shoemaker Lane south. This wetland drains in a southerly direction to Philo Brook. The SCS maps the stream as originating within this wetland complex.

Wetland Area #15 is largely a palustrine, forested, wetland complex with a red maple overstory and a shrub understory of silky dogwood, nannyberry, arrowwood, winterberry and elderberry. The herbacous cover is typically sensitive fern, skunk cabbage, jewelweed, jack in the pulpit, meadow rue and trout lily. A palustrine emergent wetland is found adjacent to the stream and consists of sedge hummocks, grasses, skunk cabbage, jewelweed, and cattails.

The SCS maps the soils in this area as Enosburg loamy sand. Permeability in the subsoil are moderately slow in the substructure. An apparent high water table is present at .5 - 1.0 foot from the surface from November to May. The Enosberg soils appear on the List of Hydric Soils in Massachusetts and New England.

Massachusetts Wetland Descriptions and Classifications

Massachusetts wetland regulations provide for the protection of wetlands, flood plains, banks and land under water. Fifteen Bordering Vegetated Wetlands (BVW) areas were delineated. Within these areas the other resource areas protected under the MWPA were typically identified.

A. Area #1 includes all four resource areas: Bordering Vegetated Wetlands, Bank, and Land Under Waterways, and Land Subject to Flooding. The BVW area can be classified as a swamp and borders an unnamed tributary to Still Brook. Inland wetland indicator species present include red maple, American elm, and arrowwood viburnum. The banks are heavily vegetated with trees and shrubs with moderate to steep slopes. The Land Under Waterways consists of fine mineral soil.

B. Area #2 consists of a Bordering Vegetated Wetland. Dominant wetland plants within the swamp area include red maple, arrowwood viburnum, silky dogwood, sensitive fern and skunk cabbage.

C. Area #3 includes all four resource areas. The BVW area can best be described as a swamp area vegetated with red maple, American elm, silky dogwood, jewelweed, skunk cabbage and sensitive fern. The bank topography within the study area is steeply sloping and heavily vegetated. Erosion is evident is areas along the eastern bank. Land Under Waterways consists of fine mineral soils.

D. Areas #4, 5 and 6 consists of Bordering Vegetated Wetlands. These areas consists of a red maple swamp with highbush blueberry, arrowwood viburnum and cinnamon and sensitive ferns as understory and groundcover species.

E. Area #7 consists of Bordering Vegetated Wetlands. The vegetational community consist of species including red maple, common cottonwood, birches, highbush blueberry, skunk cabbage and cinnamon fern. A small wet meadow area is present which is dominated by tussock sedge.

F. Area #8 consists of a red maple swamp. Understory species present in this Bordering Vegetated Wetland is arrowwood viburnum and highbush blueberry. Ground cover present include a combination of sphagnum moss, cinnamon and Massachusetts ferns and jack-in-the- pulpit.

G. Area #9 includes the four resource areas. North of existing Route 57 banks are well developed and steeply sloping along the eastern banks. Land under the waterway consists of a fine mineral soil. South of existing Route 57 the channel and bank area becomes braided and less defined. Land under the waterway consists of muck.

The Bordering Vegetated Wetland consists of red maple, American elm and eastern hemlock overstory with a highbush blueberry, winterberry and spicebush understory. Ground cover of ferns and sedges were evident.

H. Area #10 consists of all four resource areas. Banks are well developed and heavily vegetated with land under the waterway consisting of fine mineral soil. The Bordering Vegetated Wetland consists of a swamp and wet meadow area. The swamp plant community present includes red maple, pin oak, and American elm. Other wetland indicator plant species are highbush blueberry, spicebush and arrowood virburnum. The small wet meadow area is vegetated with juncus and carex species.

I. Area #11 is hydraulically connected to Area #10 with resource areas of Bordering Vegetated Wetland, and Land Under Water. The Bordering Vegetated Wetland consists of a swamp and wet meadow. Wetland indicator species present include American elm, red maple, arrowood viburnum, blue flag, skunk cabbage and tussock sedge.

The Land Under a Water Body includes fine mineral soils underlying a small farm pond.

J. Areas #12 and #13 are defined as Bordering Vegetated Wetlands. They are hydraulically connected and are located north and south of existing Route 57, respectfully. A hydrophytic vegetational community of red maple, American elm, arrowwood, skunk cabbage, cinnamon fern and sedges is present.

K. Area #14 is delineated as a Bordering Vegetated Wetland area dominated by red maple and American elm trees and saplings. A ground cover of skunk cabbage, sedges, and cinnamon fern is present.

L. Area #15 includes all four resource areas. Wetland plants commonly found within the Bordering Vegetated Wetland swamps area include red maple, arrowwood and winterberry with sedges, grasses, and jewelweed found along the stream corridor. The banks are somewhat well defined in this area and are heavily wooded. Land Under the Waterway consists of a mineral soil.

SECTION D

CRITERIA AND STANDARDS OF

MA WETLAND PROTECTION ACT

The following criteria and standards of the MA Wetland Protection Act were used in developing the wetland replacement areas:

Bordering Vegetated Wetland (310 CMR, 10.55)

Replacement Criteria:

(a) The surface area to be created shall be equal to that which will be lost.

(b) The groundwater and surface water elevation of the replacement area shall be approximately equal to that of the lost area.

(c) The overall horizontal configuration and location of the replacement area with respect to the Bank shall be similar to that of the lost area.

(d) Replacement areas shall have an unrestricted hydraulic connection to the same water body or waterway.

(e) Replacement areas shall be located within the same general area of the waterbody or reach of waterway as the lost area.

(f) At least 75% of the surface area shall be re-established with indigneous wetland plants within two growing seasons.

Inland Banks, Land Under Water, Land Subject to Flooding (310 CMR 10.60)

Alterations of wildlife habitat characteristics beyond permissible thresholds may be restored on site or replicated offsite under the following conditions:

a) The surface of the replacement area to be created ("the replacement area") shall be equal to that of the area that will be lost ("the lost area").

b) The elevation of groundwater relative to the surface of the replacement area shall be approximately equal to that of the lost area.

c) The replacement area shall be located within the same general area as the lost area. In the case of Banks and Land Under Water, the replacement area shall be located on the same water body or waterway if the latter has not been rechanneled or otherwise relocated. In the cast of Bordering Land Subject to Flooding, the replacement area shall be located approximately the same distance from the water body or waterway as the lost area.

d) Interspersion and diversity of vegetation, water and other wildlife habitat characteristics of the replacement areas, as well as its location relative to neighboring wildlife habitats, shall be similar to that of the lost area, insofar as necessary to maintain the wildlife habitat functions of the lost area.

e) The project does not alter 10 or more acres of Land Subject to Flooding or Land Under Water found to be significant to the protection of wildlife habitat, or 2,000 feet or more of Bank found to be significant to the protection of wildlife habitat.

f) The replacement area shall be provided in a manner which is consistent with the other General Performance Standards for each resource area as stated in the regulations.

SECTION E

REFERENCES

Adamus, P.R. and L.T. Stockwell. 1983. A Method for Wetland Functional Assessment - Volume 1. Federal Highway Administration, U.S. Department of Transportation. 176pp.

Environmental Laboratory. 1987. Corps of Engineers Wetlands Delineation Manual - Technical Report Y-87-1. U.S. Army Engineer Waterways Experiment Station. Vicksburg, Miss. 100pp.

Golet, F.C. 1978. Rating the Wildlife Values of Northeastern Fresh Water Wetlands. Wetland Functions and Values: The State of Our Understanding. American Water Resources Association, Minneapolis, MN. 674pp.

Reed, P.B. 1986. Wetland Plants of the State of Massachusetts 1986. U.S. Fish and Wildlife Service, St. Petersburg, FL.

U.S. Department of Agriculture - Soil Conservation Service 1976. Soil Survey of Hampden County, Massachusetts.

U.S. Department of Agriculture - Soil Conservation Service 1985. Hydric Soils of the State of Massachusetts 1985.

U.S. Department of the Interior - Fish and Wildlife Service 1976. National Wetland Inventory Map - Quandrangle. West Springfield, MA - CT.

U.S. Department of the Interior - U.S. Geologic Survey. West Springfield, MA - CT.

Cochran, Doris M. and Coleman J. Goin. The New Book of Reptiles and Amphibians. G.P. Putnam and Sons, NY. 1970.

Pritchard, Dr. Peter H. Encyclopedia of Turtles. T.F.H. Publications, Inc. 1979.

Natural Heritage and Endangered Species Program. Atlas of Estimated Habitat of State-Listed Rare Wetlands Wildlife. Boston, MA. 1988.

Martin, Alexander C., Herbert S. Zim and Arnold L. Nelson. American Wildlife and Plants: A Guide to Wildlife Food Habits. Dover Publications, Inc., New York, NY. 1951.

Massachusetts Department of Environmental Quality Engineering. Wetlands Protection Act Regulations. November, 1987.

Cowardin, Lewis M. et.al. Classification of Wetlands and Deepwater Habitats of the United States. U.S. Department of the Interior, Fish and Wildlife Service, 1979.

U.S. Department of the Interior, U.S. Fish and Wildlife Service. Endangered and Threatened Wildlife and Plants. April 10, 1987.

SECTION F

MASSACHUSETTS NATURAL HERITAGE PROGRAM

CORRESPONDENCE

Massachusetts Natural Heritage Program

OCT 03 1988

22 September 1988

Ms. Linda R. Gloshinski
Storch Engineers
220 Ridgedale Avenue
P.O. Box 267
Florham Park, NJ 07932

Re: Route 57 Relocation
Agawam and Southwick

Dear Ms. Gloshinski:

Thank you for contacting the Natural Heritage and Endangered Species Program regarding rare species and ecologically significant natural communities in the vicinity of the proposed relocation of Route 57 in Agawam and Southwick, as described in your 31 August 1988 letter.

At this time, we are aware of several state-listed species in the area of the proposed project. Our records indicate that Spotted Turtles (*Clemmys guttata*) occur in Leonard Pond. We also have records of Four-toed Salamanders, Jefferson Salamanders (*Ambystoma jeffersonianum*), and Eastern Box Turtles (*Terrapene carolina*) in the vicinity of the brook which runs south along the ridge and then east into Leonard Pond.

In view of the number of salamander and turtle records in this area we would urge that any available means be used to prevent degradation of wetland systems in the area. We would also urge that Alternative III be adopted in favor of Alternative II. Alternative II appears to impact a significant area of Spotted Turtle habitat in Leonard Pond. Alternative II also appears to join Southwick Street closer to the brook crossing, thereby entailing a higher probability of construction activities adversely affecting the brook.

Under the Wetlands Protection Act, work in wetland resource areas which serve as habitat for state-listed wildlife must conform to a "no adverse impact" performance standard. Since the proposed relocation goes through the Estimated Habitat of the state-listed species described above, this project will have to be reviewed again by this office if a Notice of Intent has to be filed under the Wetlands Protection Act. For more information about filing requirements under the Wetlands Protection Act contact Steve Roble, Wetlands Wildlife Biologist, or myself.

Please note that this review is preliminary, as it is not based on specific plans. When specific plans are available, we would appreciate the

opportunity to provide a more definitive determination in order to complete our review responsibilities under MEPA and/or the Wetlands Protection Act.

Please note that rare species data should not be made public, in order to protect vulnerable habitats and populations from degradation through collecting and visitation (please see attached "Notice to Recipients..."). In cases where permission is given by this office for publication of data in environmental information documents, the NHESP should be credited as the source of this information.

Do not hesitate to contact me if you have any further questions.

Sincerely,

Jay Copeland
Environmental Reviewer

JC/jc

cc: town file, chrono file

Massachusetts
Natural Heritage
Program

12/85

NOTICE TO RECIPIENTS OF NATURAL HERITAGE PROGRAM

RARE SPECIES LOCALITY INFORMATION

Massachusetts Natural Heritage Program rare species data are provided to selected parties "for the purposes of protecting and preserving species... of rongame wildlife and indigenous plants." Misuse of this information can actually contribute to the demise of rare and endangered plants and animals when sites are disclosed and subsequently degraded through collecting, visitation, or deliberate vandalism.

Natural Heritage Program records are exempt from the state freedom of information act (Chapter 66, Section 17D of the Massachusetts General Laws, amended by Chapter 77 of the Acts of 1985.) Thus, the Legislature has recognized the sensitivity of disclosing rare species locality information in Massachusetts.

The enclosed data, including any lists, maps, or text, pertaining to site-specific localities of named rare species, are hereby provided with the understanding that they are for the use of the requestor only and are not to be published or made public in any way without first consulting with the Massachusetts Natural Heritage Program.

Division of Fisheries and Wildlife 100 Cambridge Street, Boston, Mass. 02202 (617) 727-9194,-3151

SECTION G

USACE CORRESPONDENCE

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
424 TRAPELO ROAD
WALTHAM, MASSACHUSETTS 02254-9149

REPLY TO ATTENTION OF

0 3 OCT 1990

Regulatory Division
CENED-OD-R-199010778

Mr. George Turner, Jr.
Chief Engineer
MA Department of Public Works
Ten Park Plaza
Boston, Massachusetts 02216-3973

Dear Mr. Turner:

This is in response to your letter of September 25, 1990 containing your proposed purpose and need statement for the relocation of existing Route 57 between South Westfield Street west to just beyond the Agawam-Southwick Town line. The existing local street (U. S. Route 57 in Agawam) is currently incapable of safely handling express and local traffic.

We have determined that the basic project purpose of the project is to resolve long-standing safety and capacity deficiencies, in traffic operations and access, on existing Route 57 in Agawam, Massachusetts and to provide increased traffic capacity while moving traffic along an east-west corridor.

We will use this "basic project purpose" in determining compliance with 404(b)(1) guidelines.

We look forward to your presentation on the screening of alternatives tentatively scheduled in November 1990.

Sincerely,

William F. Lawless, P.E.
Chief, Regulatory Division
Operations Directorate

CF

U.S.F.& WS.
U.S.E.P.A.

NEW ENGLAND DIVISION, CORPS OF ENGINEERS
424 TRAPELO ROAD
WALTHAM, MASSACHUSETTS 02254-9149

May 15, 1992

Regulatory Division
CENED-OD-R-199010778

Frank Bracaglia
Deputy Chief Engineer
Project Development
Massachusetts Highway Department
Ten Park Plaza
Boston, MA 02116-3973

Dear Mr. Bracaglia:

This letter is to confirm that we have completed Phase I of our Highway Methodology for your Route 57 Western Phase project in Agawam, Massachusetts. We have determined that we should now move into Phase 2 of the Highway Methodology with two alternative alignments; alternative 3 and the MHD's preferred alignment alternative 4 as the only remaining alternatives. We have determined that the other alternatives considered in Phase 1 designated as "No Action, Alternative 1 Upgrade of Existing Route 57 and Alternative 2 Leonard's crossing and Alternative 5 Pheasant Lane Housing" fail to satisfy the "..long standing safety and capacity deficiencies, in traffic operations and access, on existing Route 57".. aspect of your Basic Project Purpose (set forth in our October 3, 1990 letter to you). Our determination of the Least Environmentally Damaging Practicable Alternative (LEDPA) will follow the Public Notice and comment period.

We require the following information in order to proceed with the next phase of our Highway Methodology:

* drawings (8 1/2" x 11") of alternative 3 & 4 suitable for our public notice (similar in detail to those used for your Rt. 57 East project).
* preliminary mitigation locations.
* a qualitative assessment of functions and values associated with each impact area.

In addition, we request that you provide us with a schedule for submittal of the foregoing within 30 days of receipt of this letter.

Please coordinate with us regarding the mitigation locations and functions/values assessment. By reviewing your draft scope of work for these activities, we can ensure that we will be getting the kind of information we need for our purposes, without causing unnecessary expenditure of time and money on your part.

If you have any questions, please call Thomas C. Bruha of my staff at 647-8058.

Sincerely,

William F. Lawless, P.E.
Chief, Regulatory Division
Operations Directorate

Copy Furnished:

Virginia Laszewski
U.S. EPA, Region I
JFK Fed. Bldg.
Boston, MA 02203-2211

Mr. William Neidermyer
U.S. Fish & Wildlife Service
Ralph Pill MKpl
22 Bridge Street
Concord, New Hampshire 03301

APPENDIX 2.

SOILS

SECTION A

SOILS DESCRIPTIONS

SOIL IDENTIFICATION MAP

SOIL DESCRIPTIONS

The U.S. Department of Agriculture Soil Conservation Service (SCS), in cooperation with the Massachusetts Agricultural Experiment Station mapped the soils of Hampden County, Massachusetts. Major field work for this soil survey was completed in the period 1960 to 1973. Statements in the publications refer to conditions in the survey area in 1975. The SCS mapping identifies twenty-three soil types within the study area (See Figure 2.1, Section B of this Appendix). Twenty soil series representing these soil types are described below.

Amostown fine sandy loam, 0 to 6 percent slopes is a nearly level, gently sloping soil. This soil is formed in thin acid glacial outwash overlying glaciolacustrine deposits. Permeability is rapid in the subsoil and moderate to slow in the substratum. It is found on terraces and deltas and is moderately well drained. Depth to bedrock is greater than 60 inches. The seasonal high water table is 1 to 2-1/2 feet below the surface from December through April.

Belgrade silt loam, 0 to 8 percent slopes is a nearly level, gently sloping soil which formed in slightly acid to neutral glaciolacustrine deposits. It is found on lakebed deposits in the larger valleys of the area. This soil is moderately well drained and permeability is moderate in the subsoil and moderate to moderately slow in the substratum. The depth to bedrock is greater than 60 inches. The seasonal high water table is 1-1/2 to 3-1/2 feet below the surface from November to April.

Buxton variant silt loam, 0 to 8 percent slopes consists of a deep, moderately well drained soil which formed in glaciolacustrine deposits. This soil is found on old lakebeds. Depth to bedrock is greater than 60 inches. The water table is perched, 1-1/2 to 3 feet below the surface, from November to May. Permeability is moderate to moderately slow in the subsoil and slow in the substratum.

Enosburg soils are nearly level, deep and poorly drained. They occupy terraces and deltas. Depth to bedrock is greater than 60 inches. The seasonal high water table is at a depth of 1/2 to 1 foot below the surface from November to May. Permeability is rapid in the subsoil and moderately slow in the subsoil. This soil appears on both the List of Hydric Soils of New England and of Massachusetts.

Limerick silt loam is a nearly level, deep, poorly drained soil. This soil is found on floodplains and formed in medium textured alluvium. Depth to bedrock is greater than 60 inches and soil permeability is moderate. The seasonal high water table is 1/2 to 1-1/2 feet below the surface from January to June. This soil appears on both the List of Hydric Soils of New England and of Massachusetts.

Meckesville soils are typically deep and well drained. They are found on the side of drumlins with slopes ranging from 3 to 25%. They have a reddish brown silt loam B horizon over a reddish brown silt clay loam fragipan. These soils are deep and well drained. Depth to bedrock is greater than 60 inches with a perched high water table at 2.5 to 3.5 feet from November to April.

The Merrimac series consists of nearly level, gently sloping to moderately steep soils. The soils are somewhat excessively drained with permeability moderately rapid in the subsoil to rapid in the substratum. Depth to bedrock is greater than 6 feet with a seasonal high water table greater than 6 feet below the surface.

Muck, shallow, consists of nearly level, very poorly drained organic material 16 to 30 inches deep. It is found in depressions and areas of less than 1 percent slopes. The mineral substratum ranges from silt loam to sand and is as much as 60% gravel. Permeability is moderate to rapid in organic layers and in the mineral substratum. Depth to bedrock is greater than 60 inches. The seasonal high water table is one foot above to one foot below the surface from September to June. Flooding is frequent and ponding is present for long durations from November to June.

Paxton fine sandy loam, 3 to 8 percent slopes consists of a deep, well drained soil which formed in glacial till. This soil is commonly found on tops and sides of drumlins. Depth to bedrock is greater than 60 inches, with a fragipan at 20 to 36 inches below the surface. Permeability is moderate or moderately rapid in the subsoil and moderately slow or slow in substratum. The water table is perched for brief periods from November to March at a depth of 2 to 3 feet below the surface.

Pollux fine sandy loam 0 - 8% slopes is a deep and well drained soil. Pollux soils were found in glacial outwash and are underlain by glaciolacustrine deposits. They are found on glacial outwash terraces and deltas. These soils are dark yellowish brown with a yellowish brown B horizon over a brown sandy loam C horizon.

Raynham silt loam consists of deep, poorly drained soil which formed in sandy glacial outwash. This soil is found in depressions and drainage-ways. Depth to bedrock is greater than 60 inches and permeability is rapid. The seasonal high water table is at 0 to 1½ feet below the surface from September to June. This soil appears on both the List of Hydric Soils of Massachusetts and of New England.

Rock-outcrop-Holyoke complex, sloping and steep occupies the Provin Mt. area. Rock outcrops consist of basalt, conglomerate, sandstone or gneiss bedrock. Depth to bedrock is 10 to 20 inches, with a seasonal high water table greater than 6 feet below the surface. Permeability is moderate.

Saco vanant silt loam is a deep, nearly level, very poorly drained soil which formed in medium textured acid alluvium. Slopes are less than 3 percent. This soil is found on floodplains where flooding is frequent and ponding occurs for brief periods from November to April The water table is perched at a depth of 1½ to 3 feet below the surface from November to May. Depth to bedrock is greater than 60 inches. This soil is on the List of Hydric Soils of New England and Massachusetts.

Scantic variant silt loam is a nearly level, poorly drained soil formed in glaciolacustrine deposits. Permeability is moderate to moderately slow in the subsoil and slow in the substratum. Bedrock is at a depth of greater than 60 inches. The water table is perched, ranging from the surface to a depth of 1-1/2 feet below the surface from October to June. This soil appears on both Lists of Hydric Soils of New England and of Massachusetts.

The Scarboro series consists of deep, very poorly drained soils which formed in glacial outwash. It is found in low areas and drainageways on terraces. Permeability is rapid to very rapid. Depth to bedrock is greater than 60 inches and the seasonal high water table is 0 to 1 foot below the surface from October to July. This soil appears on the List of Hydric Soils of New England and of Massachusetts.

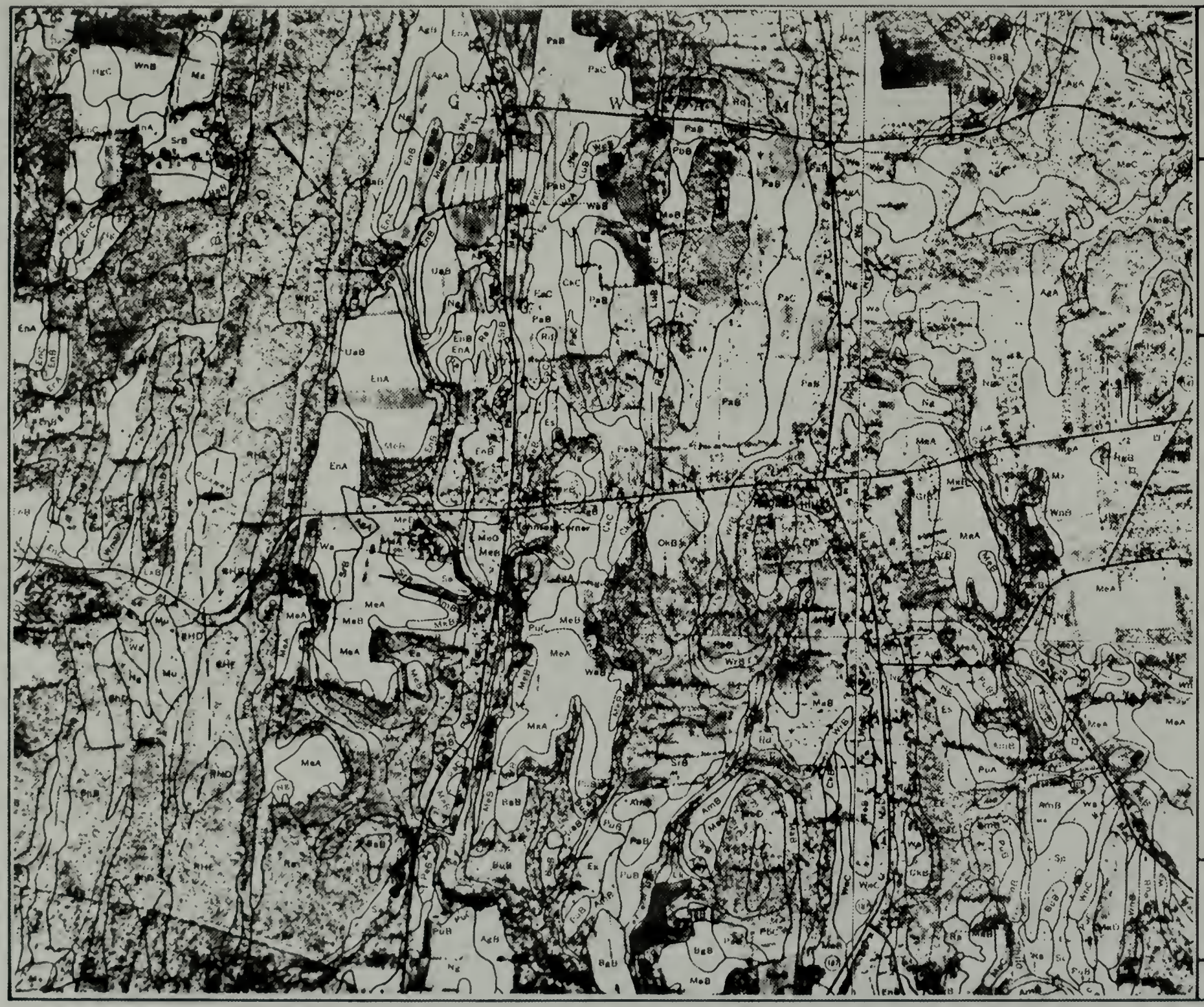
The Sudbury series are typically deep and moderately well drained. Sudbury soils were formed in glacial outwash and are found in depressions and low areas on terraces and outwash plains. They have a yellowish brown fine sandy loam and a mottled yellowish brown gravelly sandy loam B horizon.

Unadilla very fine sandy loam, 3 to 8 percent slopes, is a gently sloping, undulating soil. This soil is well drained and formed in glaciolacustrine deposits. The depth to the seasonal high water table is greater than 6 feet with depth to bedrock greater than 60 inches.

Wareham loamy sand is a deep and poorly drained soils found in depressions and drainageways on sandy glacial outwash. Permeability is rapid. The seasonal high water table is at a depth of 1-1/2 feet from September to June. This soil appears on both the Massachusetts and New England List of Hydric Soils.

Wethersfield very stony fine sandy loam, 15 to 25 percent slopes is a moderately steep, well drained soil on drumlins and ridges. Permeability is moderate in the subsoil and slow in the substratum. The water table is perched for brief periods in winter and early spring, at 2 to 3 feet below the surface. Bedrock is at a depth of greater than 60 inches.

Woodbridge soils are deep and well drained. They are coarse-loamy mixed soils, and are brown, dark yellowish brown, and mottled olive fine sandy loam. These soils are found in glacial till usually associated with drumlins. Depth to beckrock is greater than 60 inches with a perched high water table at 1.5 to 3.0 feet from November to March.



COMMONWEALTH OF MASSACHUSETTS
DEPARTMENT OF PUBLIC WORKS

ROUTE 57 RELOCATION

SOIL IDENTIFICATION MAP

SOILS LEGEND

- AmB - AMOSTOWN FINE SANDY LOAM, 0 TO 6% SLOPES
- BeB - BELGRADE SILT LOAM, 0 TO 8% SLOPES
- BuB - BUXTON VARIANT SILT LOAM 0 TO 8% SLOPES
- Es - ENOSBURG LOAMY SAND
- Lk - LIMERICK SILT LOAM
- MaB - MECHESVILLE LOAM, 3 TO 8% SLOPES
- MeA - MERRIMAC SANDY LOAM, 0 TO 3% SLOPES
- MeB - MERRIMAC SANDY LOAM, 0 TO 8% SLOPES
- MeD - MERRIMAC SANDY LOAM, 15 TO 25% SLOPES
- Mx - MUCK, SHALLOW
- PaB - PAXTON FINE SANDY LOAM, 3 TO 8% SLOPES
- PuB - POLLUX FINE SANDY LOAM, 0 TO 8% SLOPES
- Ra - RAYHAM SILT LOAM
- RHO - ROCK OUTCROP - ROLYOKE COMPLEX, SLOPING
- RHE - ROCK OUTCROP - HOLYOKE COMPLEX SILLP
- Sa - SACO VARIANT SILT LOAM
- Sc - SCANTIC VARIANT SILT LOAM
- Sp - SCARBORO FINE SANDY LOAM
- SrB - SUDBURY FINE SANDY LOAM, 0 TO 8% SLOPES
- UaB - URADILLA VERY FINE SANDY LOAM, 3 TO 8% SLOPES
- Wa - WAREHAM LOAMY SAND
- WfD - WETHERSFIELD VERY STONY FINE SANDY LOAM, 15 TO 25% SLOPES
- WrB - WOODBRIDGE FINE SANDY LOAM, 3 to 8% SLOPES

N

FIG. NO. 2.1

APPENDIX 3.

AIR QUALITY

SECTION A

CALCULATION OF MOTOR VEHICLE MESOSCALE

EMISSION RATES - MOBILE4.1

MODEL OUTPUT

Input Parameters for MOBILE4.1

Mesoscale--

- MOBILE4.1 defaults for: Tampering Rates, VMT Mix, Annual Mileage Accumulation, Registration Distribution, and Basic Exhaust Emission Rates.

- Operating Mode fraction: 20.6/27.3/20.6 (see Table B.1)

- Period 1 Reid Vapor Pressure: 11.5 psi, Period 2: 9.0 psi, 1989 start year.

- Summer temperature conditions-- minimum 68°F, maximum 94°F (worst case for NMHC).

- Credit for the Commonwealth's Inspection and Maintenance program assuming an 12% stringency factor, a start year of 1983, a 1% waiver rate, and an 85% compliance rate.

- Credit for Stage II Vapor Recovery with a 1991 start year, a 3 year phase in period, and 95% efficiency for all vehicle types.

1988 - MESOSCALE MOBILE SOURCE EMISSIONS - ROUTE 57 EIR/EIS AGAWAM, MA.
MOBILE4.1(4Nov91)

I/M program selected:

Start year (January 1):	1983
Pre-1981 MYR stringency rate:	12%
First model year covered:	1974
Last model year covered:	2020
Waiver rate (pre-1981):	1.%
Waiver rate (1981 and newer):	1.%
Compliance Rate:	85.%
Inspection type:	Computerized decentralized
Inspection frequency	Annual
Vehicle types covered:	LDGV - Yes
	LDGT1 - Yes
	LDGT2 - Yes
	HDGV - No
1981 & later MYR test type:	Idle

Minimum Temp: 68. (F) Maximum Temp: 94. (F)
Period 1 RVP: 11.5 Period 2 RVP: 9.0 Period 2 Start Yr: 1989

VOC HC emission factors include evaporative HC emission factors.

Cal. Year: 1988 I/M Program: Yes Ambient Temp: 87.8 / 87.8 / 87.8 (F) Region: Low
Anti-tam. Program: No Operating Mode: 20.6 / 27.3 / 20.6 Altitude: 500. Ft.

Veh. Type:	LDGV	LDGT1	LDGT2	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
Veh. Speeds:	35.0	35.0	35.0		35.0	35.0	35.0	35.0	35.0	
VMT Mix:	0.637	0.159	0.076		0.035	0.013	0.003	0.068	0.009	
Composite Emission Factors (Gm/Mile)										
VOC HC:	3.97	4.23	6.47	4.95	13.90	0.39	0.51	2.00	7.24	4.385
Exhaust HC:	1.19	1.55	2.03	1.71	3.21	0.39	0.51	2.00	1.87	1.429
Evaporat HC:	1.69	1.66	3.13	2.13	8.41				4.82	1.911
Refuel L HC:	0.28	0.35	0.36	0.36	0.58					0.286
Runing L HC:	0.67	0.55	0.82	0.64	1.51					0.629
Rsting L HC:	0.14	0.12	0.12	0.12	0.18				0.54	0.131
Exhaust CO:	17.04	20.85	24.46	22.02	87.11	0.87	0.96	7.59	14.04	19.706
Exhaust NOX:	1.50	1.95	2.43	2.10	6.21	1.36	1.53	18.16	0.95	2.936

Cal. Year: 1988 I/M Program: Yes Ambient Temp: 87.8 / 87.8 / 87.8 (F) Region: Low
Anti-tam. Program: No Operating Mode: 20.6 / 27.3 / 20.6 Altitude: 500. Ft.

Veh. Type:	LDGV	LDGT1	LDGT2	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
Veh. Speeds:	40.0	40.0	40.0		40.0	40.0	40.0	40.0	40.0	
VMT Mix:	0.637	0.159	0.076		0.035	0.013	0.003	0.068	0.009	
Composite Emission Factors (Gm/Mile)										
VOC HC:	3.69	3.93	6.06	4.62	13.18	0.35	0.45	1.79	7.07	4.084
Exhaust HC:	1.03	1.33	1.74	1.46	2.70	0.35	0.45	1.79	1.71	1.240
Evaporat HC:	1.69	1.66	3.13	2.13	8.41				4.82	1.911
Refuel L HC:	0.28	0.35	0.36	0.36	0.58					0.286
Runing L HC:	0.54	0.47	0.71	0.55	1.31					0.517
Rsting L HC:	0.14	0.12	0.12	0.12	0.18				0.54	0.131
Exhaust CO:	14.66	17.73	20.71	18.69	80.62	0.79	0.87	6.88	12.16	17.115
Exhaust NOX:	1.51	1.96	2.45	2.12	6.45	1.39	1.58	18.65	0.99	2.988

Cal. Year: 1988 I/M Program: Yes Ambient Temp: 87.8 / 87.8 / 87.8 (F) Region: Low
Anti-tam. Program: No Operating Mode: 20.6 / 27.3 / 20.6 Altitude: 500. Ft.

Veh. Type:	LDGV	LDGT1	LDGT2	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
Veh. Speeds:	45.0	45.0	45.0		45.0	45.0	45.0	45.0	45.0	
VMT Mix:	0.637	0.159	0.076		0.035	0.013	0.003	0.068	0.009	
Composite Emission Factors (Gm/Mile)										
VOC HC:	3.47	3.71	5.77	4.38	12.68	0.32	0.41	1.64	6.97	3.857
Exhaust HC:	0.93	1.18	1.54	1.30	2.36	0.32	0.41	1.64	1.61	1.111
Evaporat HC:	1.69	1.66	3.13	2.13	8.41				4.82	1.911
Refuel L HC:	0.28	0.35	0.36	0.36	0.58					0.286
Runing L HC:	0.42	0.40	0.61	0.47	1.14					0.419
Rsting L HC:	0.14	0.12	0.12	0.12	0.18				0.54	0.131
Exhaust CO:	13.07	15.83	18.16	16.58	78.82	0.75	0.82	6.52	10.98	15.511
Exhaust NOX:	1.53	1.98	2.48	2.14	6.70	1.48	1.68	19.84	1.02	3.097

DRIVER calls completed.

M120 Warning: MOBILE4.1 does not model most 1993 and later Clean Air Act
requirements; Emission Factors for CY 1993 or later are affected.

I/M program selected:

Start year (January 1):	1983
Pre-1981 MYR stringency rate:	12%
First model year covered:	1979
Last model year covered:	2020
Waiver rate (pre-1981):	1.%
Waiver rate (1981 and newer):	1.%
Compliance Rate:	85.%
Inspection type:	Computerized decentralized
Inspection frequency	Annual
Vehicle types covered:	LDGV - Yes
	LDGT1 - Yes
	LDGT2 - Yes
	HDGV - No
1981 & later MYR test type:	Idle

Minimum Temp: 68. (F) Maximum Temp: 94. (F)
Period 1 RVP: 11.5 Period 2 RVP: 9.0 Period 2 Start Yr: 1989

VOC HC emission factors include evaporative HC emission factors.

Cal. Year: 1993✓ I/M Program: Yes Ambient Temp: 87.8 / 87.8 / 87.8 (F) Region: Low
Anti-tam. Program: No Operating Mode: 20.6 / 27.3 / 20.6 Altitude: 500. Ft.

Veh. Type:	LDGV	LDGT1	LDGT2	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
Veh. Speeds:	35.0✓	35.0	35.0		35.0	35.0	35.0	35.0	35.0	
VMT Mix:	0.610	0.183	0.077		0.035	0.006	0.002	0.080	0.008	
Composite Emission Factors (Gm/Mile)										
VOC HC:	1.59	1.89	2.45	2.05	4.90	0.47	0.64	1.52	4.85	1.835
Exhaust HC:	0.56	0.89	1.08	0.95	1.77	0.47	0.64	1.52	1.34	0.784
Evaporat HC:	0.54	0.55	0.85	0.64	2.34				2.97	0.602
Refuel L HC:	0.08	0.11	0.11	0.11	0.18					0.083
Runing L HC:	0.27	0.24	0.29	0.26	0.46					0.250
Rsting L HC:	0.13	0.11	0.11	0.11	0.15				0.54	0.115
Exhaust CO:	7.31	9.82	11.94	10.45	46.66	0.95	1.09	6.70	13.24	9.441
Exhaust NOX:	0.85	1.18	1.40	1.25	5.82	1.46	1.63	12.58	0.99	2.068

Cal. Year: 1993 I/M Program: Yes Ambient Temp: 87.8 / 87.8 / 87.8 (F) Region: Low
Anti-tam. Program: No Operating Mode: 20.6 / 27.3 / 20.6 Altitude: 500. Ft.

Veh. Type:	LDGV	LDGT1	LDGT2	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
Veh. Speeds:	40.0✓	40.0	40.0		40.0	40.0	40.0	40.0	40.0	
VMT Mix:	0.610	0.183	0.077		0.035	0.006	0.002	0.080	0.008	
Composite Emission Factors (Gm/Mile)										
VOC HC:	1.45	1.71	2.23	1.86	4.55	0.42	0.58	1.36	4.74	1.679
Exhaust HC:	0.48	0.75	0.90	0.79	1.49	0.42	0.58	1.36	1.22	0.671
Evaporat HC:	0.54	0.55	0.85	0.64	2.34				2.97	0.602
Refuel L HC:	0.08	0.11	0.11	0.11	0.18					0.083
Runing L HC:	0.23	0.20	0.25	0.22	0.39					0.208
Rsting L HC:	0.13	0.11	0.11	0.11	0.15				0.54	0.115
Exhaust CO:	6.06	8.16	9.87	8.67	43.18	0.86	0.99	6.07	11.39	8.030
Exhaust NOX:	0.82	1.15	1.38	1.22	6.05	1.50	1.67	12.92	1.03	2.082

Cal. Year: 1993 I/M Program: Yes Ambient Temp: 87.8 / 87.8 / 87.8 (F) Region: Low
Anti-tam. Program: No Operating Mode: 20.6 / 27.3 / 20.6 Altitude: 500. Ft.

Veh. Type:	LDGV	LDGT1	LDGT2	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
Veh. Speeds:	45.0✓	45.0	45.0		45.0	45.0	45.0	45.0	45.0	
VMT Mix:	0.610	0.183	0.077		0.035	0.006	0.002	0.080	0.008	
Composite Emission Factors (Gm/Mile)										
VOC HC:	1.35	1.58	2.07	1.72	4.31	0.38	0.53	1.25	4.67	1.561
Exhaust HC:	0.42	0.64	0.78	0.68	1.30	0.38	0.53	1.25	1.16	0.589
Evaporat HC:	0.54	0.55	0.85	0.64	2.34				2.97	0.602
Refuel L HC:	0.08	0.11	0.11	0.11	0.18					0.083
Runing L HC:	0.18	0.17	0.22	0.18	0.33					0.171
Rsting L HC:	0.13	0.11	0.11	0.11	0.15				0.54	0.115
Exhaust CO:	5.16	7.07	8.39	7.46	42.22	0.82	0.94	5.76	10.23	7.099
Exhaust NOX:	0.81	1.14	1.36	1.20	6.27	1.59	1.78	13.74	1.06	2.143

Cal. Year: 1993 I/M Program: Yes Ambient Temp: 87.8 / 87.8 / 87.8 (F) Region: Low
Anti-tam. Program: No Operating Mode: 20.6 / 27.3 / 20.6 Altitude: 500. Ft.

Veh. Type:	LDGV	LDGT1	LDGT2	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
Veh. Speeds:	50.0 ✓	50.0	50.0		50.0	50.0	50.0	50.0	50.0	
VMT Mix:	0.610	0.183	0.077		0.035	0.006	0.002	0.080	0.008	
Composite Emission Factors (Gm/Mile)										
VOC HC:	1.32	1.55	2.03	1.69	4.14	0.36	0.49	1.17	4.74	1.521
Exhaust HC:	0.42	0.64	0.77	0.68	1.19	0.36	0.49	1.17	1.22	0.581
Evaporat HC:	0.54	0.55	0.85	0.64	2.34				2.97	0.602
Refuel L HC:	0.08	0.11	0.11	0.11	0.18					0.083
Runing L HC:	0.15	0.14	0.18	0.15	0.28					0.140
Rsting L HC:	0.13	0.11	0.11	0.11	0.15				0.54	0.115
Exhaust CO:	6.25	8.72	10.16	9.15	43.61	0.81	0.93	5.71	12.88	8.268
Exhaust NOX:	0.87	1.22	1.47	1.29	6.50	1.76	1.96	15.15	1.16	2.325

DRIVER calls completed.

M120 Warning: MOBILE4.1 does not model most 1993 and later Clean Air Act requirements; Emission Factors for CY 1993 or later are affected.

I/M program selected:

Start year (January 1):	1983
Pre-1981 MYR stringency rate:	12%
First model year covered:	1999
Last model year covered:	2020
Waiver rate (pre-1981):	1.%
Waiver rate (1981 and newer):	1.%
Compliance Rate:	85.%
Inspection type:	Computerized decentralized
Inspection frequency	Annual
Vehicle types covered:	LDGV - Yes
	LDGT1 - Yes
	LDGT2 - Yes
	HDGV - No
1981 & later MYR test type:	Idle

Minimum Temp: 68. (F) Maximum Temp: 94. (F)
Period 1 RVP: 11.5 Period 2 RVP: 9.0 Period 2 Start Yr: 1989

VOC HC emission factors include evaporative HC emission factors.

Cal. Year: 2013 I/M Program: Yes Ambient Temp: 87.8 / 87.8 / 87.8 (F) Region: Low
Anti-tam. Program: No Operating Mode: 20.6 / 27.3 / 20.6 Altitude: 500. Ft.

Veh. Type:	LDGV	LDGT1	LDGT2	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
Veh. Speeds:	30.0	30.0	30.0		30.0	30.0	30.0	30.0	30.0	
VMT Mix:	0.551	0.210	0.081		0.036	0.002	0.004	0.111	0.005	
Composite Emission Factors (Gm/Mile)										
VOC HC:	1.21	1.35	1.54	1.41	2.92	0.36	0.46	1.49	4.91	1.375
Exhaust HC:	0.31	0.54	0.62	0.56	0.87	0.36	0.46	1.49	1.40	0.542
Evaporat HC:	0.45	0.42	0.49	0.44	1.54				2.97	0.446
Refuel L HC:	0.02	0.03	0.03	0.03	0.05					0.023
Runing L HC:	0.33	0.27	0.31	0.28	0.36					0.276
Rsting L HC:	0.10	0.09	0.09	0.09	0.09				0.54	0.088
Exhaust CO:	3.97	4.39	5.37	4.67	13.13	0.92	0.99	7.07	15.89	4.890
Exhaust NOX:	0.49	0.73	0.78	0.75	4.54	0.95	1.04	7.07	0.93	1.444

Cal. Year: 2013 I/M Program: Yes Ambient Temp: 87.8 / 87.8 / 87.8 (F) Region: Low
Anti-tam. Program: No Operating Mode: 20.6 / 27.3 / 20.6 Altitude: 500. Ft.

Veh. Type:	LDGV	LDGT1	LDGT2	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
Veh. Speeds:	35.0	35.0	35.0		35.0	35.0	35.0	35.0	35.0	
VMT Mix:	0.551	0.210	0.081		0.036	0.002	0.004	0.111	0.005	
Composite Emission Factors (Gm/Mile)										
VOC HC:	1.09	1.20	1.36	1.24	2.69	0.32	0.41	1.30	4.76	1.230
Exhaust HC:	0.25	0.42	0.48	0.44	0.70	0.32	0.41	1.30	1.24	0.443
Evaporat HC:	0.45	0.42	0.49	0.44	1.54				2.97	0.446
Refuel L HC:	0.02	0.03	0.03	0.03	0.05					0.023
Runing L HC:	0.27	0.23	0.26	0.24	0.30					0.230
Rsting L HC:	0.10	0.09	0.09	0.09	0.09				0.54	0.088
Exhaust CO:	2.89	3.19	3.89	3.38	11.50	0.79	0.85	6.12	13.24	3.744
Exhaust NOX:	0.44	0.66	0.70	0.67	4.72	0.94	1.03	7.00	0.99	1.394

Cal. Year: 2013 I/M Program: Yes Ambient Temp: 87.8 / 87.8 / 87.8 (F) Region: Low
Anti-tam. Program: No Operating Mode: 20.6 / 27.3 / 20.6 Altitude: 500. Ft.

Veh. Type:	LDGV	LDGT1	LDGT2	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
Veh. Speeds:	40.0	40.0	40.0		40.0	40.0	40.0	40.0	40.0	
VMT Mix:	0.551	0.210	0.081		0.036	0.002	0.004	0.111	0.005	
Composite Emission Factors (Gm/Mile)										
VOC HC:	0.99	1.08	1.22	1.12	2.52	0.29	0.36	1.17	4.65	1.117
Exhaust HC:	0.20	0.34	0.39	0.35	0.59	0.29	0.36	1.17	1.14	0.369
Evaporat HC:	0.45	0.42	0.49	0.44	1.54				2.97	0.446
Refuel L HC:	0.02	0.03	0.03	0.03	0.05					0.023
Runing L HC:	0.22	0.20	0.22	0.20	0.25					0.191
Rsting L HC:	0.10	0.09	0.09	0.09	0.09				0.54	0.088
Exhaust CO:	2.08	2.28	2.78	2.42	10.64	0.72	0.77	5.55	11.39	2.914
Exhaust NOX:	0.40	0.60	0.63	0.61	4.90	0.96	1.06	7.19	1.03	1.385

Cal. Year: 2013 I/M Program: Yes Ambient Temp: 87.8 / 87.8 / 87.8 (F) Region: Low
Anti-tam. Program: No Operating Mode: 20.6 / 27.3 / 20.6 Altitude: 500. Ft.

Veh. Type:	LDGV	LDGT1	LDGT2	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
Veh. Speeds:	45.0	45.0	45.0		45.0	45.0	45.0	45.0	45.0	
VMT Mix:	0.551	0.210	0.081		0.036	0.002	0.004	0.111	0.005	
Composite Emission Factors (Gm/Mile)										
VOC HC:	0.91	0.98	1.11	1.02	2.40	0.26	0.33	1.07	4.59	1.027
Exhaust HC:	0.16	0.27	0.31	0.28	0.52	0.26	0.33	1.07	1.07	0.314
Evaporat HC:	0.45	0.42	0.49	0.44	1.54				2.97	0.446
Refuel L HC:	0.02	0.03	0.03	0.03	0.05					0.023
Runing L HC:	0.18	0.17	0.19	0.17	0.20					0.157
Rsting L HC:	0.10	0.09	0.09	0.09	0.09				0.54	0.088
Exhaust CO:	1.45	1.57	1.92	1.67	10.41	0.68	0.73	5.26	10.23	2.303
Exhaust NOX:	0.37	0.56	0.59	0.57	5.09	1.02	1.13	7.64	1.06	1.414

Cal. Year: 2013 I/M Program: Yes Ambient Temp: 87.8 / 87.8 / 87.8 (F) Region: Low
Anti-tam. Program: No Operating Mode: 20.6 / 27.3 / 20.6 Altitude: 500. Ft.

Veh. Type:	LDGV	LDGT1	LDGT2	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
Veh. Speeds:	50.0	50.0	50.0		50.0	50.0	50.0	50.0	50.0	
VMT Mix:	0.551	0.210	0.081		0.036	0.002	0.004	0.111	0.005	
Composite Emission Factors (Gm/Mile)										
VOC HC:	0.86	0.94	1.07	0.97	2.32	0.24	0.31	1.00	4.65	0.980
Exhaust HC:	0.15	0.26	0.29	0.27	0.47	0.24	0.31	1.00	1.14	0.296
Evaporat HC:	0.45	0.42	0.49	0.44	1.54				2.97	0.446
Refuel L HC:	0.02	0.03	0.03	0.03	0.05					0.023
Runing L HC:	0.15	0.14	0.16	0.14	0.17					0.128
Rsting L HC:	0.10	0.09	0.09	0.09	0.09				0.54	0.088
Exhaust CO:	1.50	1.61	1.97	1.71	10.75	0.68	0.73	5.22	12.88	2.364
Exhaust NOX:	0.39	0.58	0.61	0.59	5.27	1.13	1.24	8.43	1.16	1.523

DRIVER calls completed.

SECTION B

CALCULATION OF MOTOR VEHICLE MICROSCALE

EMISSION RATES - MOBILE4.1

MODEL OUTPUT

Input Parameters for MOBILE4.1

Microscale--

- MOBILE4.1 defaults for: Tampering Rates, VMT Mix, Annual Mileage Accumulation, Registration Distribution, and Basic Exhaust Emission Rates.

- Operating Mode fraction, 1-hour: 50.0/10.0/50.0, 8-hour: 20.6/27.3/20.6 (see Table B.1)

- Period 1 Reid Vapor Pressure: 13.5 psi, Period 2: 13.5 psi, 1989 start year.

- Winter temperature conditions-- minimum 29°F, maximum 30°F (worst case for CO).

- Credit for the Commonwealth's Inspection and Maintenance program assuming an 12% stringency factor, a start year of 1983, a 1% waiver rate, and an 85% compliance rate.

- Credit for Stage II Vapor Recovery with a 1991 start year, a 3 year phase in period, and 95% efficiency for all vehicle types.

TABLE B.1

COLD/HOT START MIX FOR MOTOR VEHICLE EMISSIONS

	1-Hour	8-Hour
Cold Start	50.0%	20.6%
Hot Start	10.0%	27.3%
Hot Stabilized	40.0%	52.1%
Total	100.0%	100.0%

TABLE B.2

IDLING CO EMISSION RATES FOR THE MICROSCALE ANALYSIS (grams/minute)

	1-Hour	8-Hour
1988	22.54	13.40
1993	13.20	7.98
2013	4.52	3.18

Note: These idling emission rates are derived from MOBILE4.1 calculations.

1988 - 1hr MICROSCALE MOBILE SOURCE EMISSIONS - ROUTE 57 EIR/EIS AGAWAM, MA.
MOBILE4.1(4Nov91)

M 10 Warning: RLFLAG=2 & PRTFLG not = 1 or 4, so RLFLAG input records skipped.
M111 Error: The calculated exhaust temperature 31.3 is < daily min temp or > daily max temp

I/M program selected:

Start year (January 1):	1983
Pre-1981 MYR stringency rate:	12%
First model year covered:	1974
Last model year covered:	2020
Waiver rate (pre-1981):	1.%
Waiver rate (1981 and newer):	1.%
Compliance Rate:	85.%
Inspection type:	Computerized decentralized
Inspection frequency	Annual
Vehicle types covered:	LDGV - Yes
	LDGT1 - Yes
	LDGT2 - Yes
	HDGV - No
1981 & later MYR test type:	Idle

Minimum Temp: 29. (F) Maximum Temp: 30. (F)
Period 1 RVP: 13.5 Period 2 RVP: 13.5 Period 2 Start Yr: 1989

VOC HC emission factors include evaporative HC emission factors.

Cal. Year: 1988 I/M Program: Yes Ambient Temp: 31.3 (F) Region: Low
Anti-tam. Program: No Operating Mode: 50.0 / 10.0 / 50.0 Altitude: 500. Ft.

Veh. Type:	LDGV	LDGT1	LDGT2	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
Veh. Speeds:	35.0	35.0	35.0		35.0	35.0	35.0	35.0	35.0	
VMT Mix:	0.637	0.159	0.076		0.035	0.013	0.003	0.068	0.009	
Composite Emission Factors (Gm/Mile)										
Exhaust CO:	35.67	41.02	48.50	43.43	77.05	1.01	1.09	7.59	27.33	36.383
Hot Stabilized Idle Emission Factors (Gm/Hr)										
Idle CO:	1398.59	1847.40	1860.87	1851.74	504.13	21.86	35.02	52.46	475.62	1352.384

M111 Error: The calculated exhaust temperature 31.3 is < daily min temp or > daily max temp

Cal. Year: 1988 I/M Program: Yes Ambient Temp: 31.3 (F) Region: Low
Anti-tam. Program: No Operating Mode: 50.0 / 10.0 / 50.0 Altitude: 500. Ft.

Veh. Type:	LDGV	LDGT1	LDGT2	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
Veh. Speeds:	40.0	40.0	40.0		40.0	40.0	40.0	40.0	40.0	
VMT Mix:	0.637	0.159	0.076		0.035	0.013	0.003	0.068	0.009	
Composite Emission Factors (Gm/Mile)										
Exhaust CO:	30.37	34.65	40.94	36.68	71.31	0.92	0.99	6.88	23.65	31.141
Hot Stabilized Idle Emission Factors (Gm/Hr)										
Idle CO:	1398.59	1847.40	1860.87	1851.74	504.13	21.86	35.02	52.46	475.62	1352.384

M111 Error: The calculated exhaust temperature 31.3 is < daily min temp or > daily max temp

Cal. Year: 1988 I/M Program: Yes Ambient Temp: 31.3 (F) Region: Low
Anti-tam. Program: No Operating Mode: 50.0 / 10.0 / 50.0 Altitude: 500. Ft.

Veh. Type:	LDGV	LDGT1	LDGT2	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
Veh. Speeds:	45.0	45.0	45.0		45.0	45.0	45.0	45.0	45.0	
VMT Mix:	0.637	0.159	0.076		0.035	0.013	0.003	0.068	0.009	
Composite Emission Factors (Gm/Mile)										
Exhaust CO:	26.71	30.66	35.79	32.31	69.72	0.87	0.94	6.52	21.33	27.681
Hot Stabilized Idle Emission Factors (Gm/Hr)										
Idle CO:	1398.59	1847.40	1860.87	1851.74	504.13	21.86	35.02	52.46	475.62	1352.384

DRIVER calls completed.

1993 - 1hr MICROSCALE MOBILE SOURCE EMISSIONS - ROUTE 57 EIR/EIS AGAWAM, MA.
MOBILE4.1(4Nov91)

M 10 Warning: RLFLAG=2 & PRTFLG not = 1 or 4, so RLFLAG input records skipped.
M111 Error: The calculated exhaust temperature 31.3 is < daily min temp or > daily max temp
M120 Warning: MOBILE4.1 does not model most 1993 and later Clean Air Act requirements; Emission Factors for CY 1993 or later are affected.

I/M program selected:

Start year (January 1):	1983
Pre-1981 MYR stringency rate:	12%
First model year covered:	1979
Last model year covered:	2020
Waiver rate (pre-1981):	1.%
Waiver rate (1981 and newer):	1.%
Compliance Rate:	85.%
Inspection type:	Computerized decentralized
Inspection frequency	Annual
Vehicle types covered:	LDGV - Yes
	LDGT1 - Yes
	LDGT2 - Yes
	HDGV - No
1981 & later MYR test type:	Idle

Minimum Temp: 29. (F) Maximum Temp: 30. (F)
Period 1 RVP: 13.5 Period 2 RVP: 13.5 Period 2 Start Yr: 1989

VOC HC emission factors include evaporative HC emission factors.

Cal. Year: 1993 I/M Program: Yes Ambient Temp: 31.3 (F) Region: Low
Anti-tam. Program: No Operating Mode: 50.0 / 10.0 / 50.0 Altitude: 500. Ft.

Veh. Type:	LDGV	LDGT1	LDGT2	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
Veh. Speeds:	35.0	35.0	35.0		35.0	35.0	35.0	35.0	35.0	
VMT Mix:	0.610	0.183	0.077		0.035	0.006	0.002	0.080	0.008	
Composite Emission Factors (Gm/Mile)										
Exhaust CO:	21.50	25.46	29.28	26.60	42.84	1.13	1.24	6.70	25.95	22.262
Hot Stabilized Idle Emission Factors (Gm/Hr)										
Idle CO:	831.57	971.74	1116.91	1014.91	374.90	26.85	38.77	50.93	465.39	792.106

M111 Error: The calculated exhaust temperature 31.3 is < daily min temp or > daily max temp

Cal. Year: 1993 I/M Program: Yes Ambient Temp: 31.3 (F) Region: Low
Anti-tam. Program: No Operating Mode: 50.0 / 10.0 / 50.0 Altitude: 500. Ft.

Veh. Type:	LDGV	LDGT1	LDGT2	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
Veh. Speeds:	40.0	40.0	40.0		40.0	40.0	40.0	40.0	40.0	
VMT Mix:	0.610	0.183	0.077		0.035	0.006	0.002	0.080	0.008	
Composite Emission Factors (Gm/Mile)										
Exhaust CO:	17.34	20.56	23.70	21.49	39.65	1.02	1.13	6.07	22.34	18.208
Hot Stabilized Idle Emission Factors (Gm/Hr)										
Idle CO:	831.57	971.74	1116.91	1014.91	374.90	26.85	38.77	50.93	465.39	792.106

M111 Error: The calculated exhaust temperature 31.3 is < daily min temp or > daily max temp

Cal. Year: 1993 I/M Program: Yes Ambient Temp: 31.3 (F) Region: Low
Anti-tam. Program: No Operating Mode: 50.0 / 10.0 / 50.0 Altitude: 500. Ft.

Veh. Type:	LDGV	LDGT1	LDGT2	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
Veh. Speeds:	45.0	45.0	45.0		45.0	45.0	45.0	45.0	45.0	
VMT Mix:	0.610	0.183	0.077		0.035	0.006	0.002	0.080	0.008	
Composite Emission Factors (Gm/Mile)										
Exhaust CO:	14.23	17.15	19.60	17.88	38.76	0.97	1.07	5.76	20.06	15.300
Hot Stabilized Idle Emission Factors (Gm/Hr)										
Idle CO:	831.57	971.74	1116.91	1014.91	374.90	26.85	38.77	50.93	465.39	792.106

M111 Error: The calculated exhaust temperature 31.3 is < daily min temp or > daily max temp

Cal. Year: 1993 I/M Program: Yes Ambient Temp: 31.3 (F) Region: Low
Anti-tam. Program: No Operating Mode: 50.0 / 10.0 / 50.0 Altitude: 500. Ft.

Veh. Type:	LDGV	LDGT1	LDGT2	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
Veh. Speeds:	50.0	50.0	50.0		50.0	50.0	50.0	50.0	50.0	
VMT Mix:	0.610	0.183	0.077		0.035	0.006	0.002	0.080	0.008	
Composite Emission Factors (Gm/Mile)										
Exhaust CO:	16.80	20.58	23.30	21.39	40.04	0.96	1.06	5.71	25.25	17.863

Hot Stabilized Idle Emission Factors (Gm/Hr)										
Idle CO:	831.57	971.74	1116.91	1014.91	374.90	26.85	38.77	50.93	465.39	792.106

DRIVER calls completed.

2013 - 1hr MICROSCALE MOBILE SOURCE EMISSIONS - ROUTE 57 EIR/EIS AGAWAM, MA.
MOBILE4.1(4Nov91)

M 10 Warning: RLFLAG=2 & PRTFLG not = 1 or 4, so RLFLAG input records skipped.
M111 Error: The calculated exhaust temperature 31.3 is < daily min temp or > daily max temp
M120 Warning: MOBILE4.1 does not model most 1993 and later Clean Air Act requirements; Emission Factors for CY 1993 or later are affected.

I/M program selected:

Start year (January 1):	1983
Pre-1981 MYR stringency rate:	12%
First model year covered:	1999
Last model year covered:	2020
Waiver rate (pre-1981):	1.%
Waiver rate (1981 and newer):	1.%
Compliance Rate:	85.%
Inspection type:	Computerized decentralized
Inspection frequency	Annual
Vehicle types covered:	LDGV - Yes
	LDGT1 - Yes
	LDGT2 - Yes
	HDGV - No
1981 & later MYR test type:	Idle

Minimum Temp: 29. (F) Maximum Temp: 30. (F)
Period 1 RVP: 13.5 Period 2 RVP: 13.5 Period 2 Start Yr: 1989

VOC HC emission factors include evaporative HC emission factors.

Cal. Year: 2013 I/M Program: Yes Ambient Temp: 31.3 (F) Region: Low
Anti-tam. Program: No Operating Mode: 50.0 / 10.0 / 50.0 Altitude: 500. Ft.

Veh. Type:	LDGV	LDGT1	LDGT2	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
Veh. Speeds:	30.0	30.0	30.0		30.0	30.0	30.0	30.0	30.0	
VMT Mix:	0.551	0.210	0.081		0.036	0.002	0.004	0.111	0.005	
Composite Emission Factors (Gm/Mile)										
Exhaust CO:	10.31	14.30	15.92	14.75	15.08	1.07	1.13	7.07	31.15	11.473
Hot Stabilized Idle Emission Factors (Gm/Hr)										
Idle CO:	269.98	342.97	395.36	357.55	277.09	20.12	32.85	49.90	465.39	271.035

M111 Error: The calculated exhaust temperature 31.3 is < daily min temp or > daily max temp

Cal. Year: 2013 I/M Program: Yes Ambient Temp: 31.3 (F) Region: Low
Anti-tam. Program: No Operating Mode: 50.0 / 10.0 / 50.0 Altitude: 500. Ft.

Veh. Type:	LDGV	LDGT1	LDGT2	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
Veh. Speeds:	35.0	35.0	35.0		35.0	35.0	35.0	35.0	35.0	
VMT Mix:	0.551	0.210	0.081		0.036	0.002	0.004	0.111	0.005	
Composite Emission Factors (Gm/Mile)										
Exhaust CO:	7.51	10.36	11.54	10.69	13.21	0.93	0.97	6.12	25.95	8.547
Hot Stabilized Idle Emission Factors (Gm/Hr)										
Idle CO:	269.98	342.97	395.36	357.55	277.09	20.12	32.85	49.90	465.39	271.035

M111 Error: The calculated exhaust temperature 31.3 is < daily min temp or > daily max temp

Cal. Year: 2013 I/M Program: Yes Ambient Temp: 31.3 (F) Region: Low
Anti-tam. Program: No Operating Mode: 50.0 / 10.0 / 50.0 Altitude: 500. Ft.

Veh. Type:	LDGV	LDGT1	LDGT2	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
Veh. Speeds:	40.0	40.0	40.0		40.0	40.0	40.0	40.0	40.0	
VMT Mix:	0.551	0.210	0.081		0.036	0.002	0.004	0.111	0.005	
Composite Emission Factors (Gm/Mile)										
Exhaust CO:	5.41	7.41	8.25	7.65	12.22	0.84	0.88	5.55	22.34	6.385
Hot Stabilized Idle Emission Factors (Gm/Hr)										
Idle CO:	269.98	342.97	395.36	357.55	277.09	20.12	32.85	49.90	465.39	271.035

M111 Error: The calculated exhaust temperature 31.3 is < daily min temp or > daily max temp

Cal. Year: 2013 I/M Program: Yes Ambient Temp: 31.3 (F) Region: Low
Anti-tam. Program: No Operating Mode: 50.0 / 10.0 / 50.0 Altitude: 500. Ft.

Veh. Type:	LDGV	LDGT1	LDGT2	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
Veh. Speeds:	45.0	45.0	45.0		45.0	45.0	45.0	45.0	45.0	
VMT Mix:	0.551	0.210	0.081		0.036	0.002	0.004	0.111	0.005	
Composite Emission Factors (Gm/Mile)										
Exhaust CO:	3.78	5.12	5.70	5.28	11.95	0.80	0.84	5.26	20.06	4.742

Hot Stabilized Idle Emission Factors (Gm/Hr)

Idle CO:	269.98	342.97	395.36	357.55	277.09	20.12	32.85	49.90	465.39	271.035

Mill Error: The calculated exhaust temperature 31.3 is < daily min temp or > daily max temp

Cal. Year: 2013 I/M Program: Yes Ambient Temp: 31.3 (F) Region: Low
Anti-tam. Program: No Operating Mode: 50.0 / 10.0 / 50.0 Altitude: 500. Ft.

Veh. Type:	LDGV	LDGT1	LDGT2	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
Veh. Speeds:	50.0	50.0	50.0		50.0	50.0	50.0	50.0	50.0	
VMT Mix:	0.551	0.210	0.081		0.036	0.002	0.004	0.111	0.005	

Composite Emission Factors (Gm/Mile)

Exhaust CO:	3.91	5.24	5.84	5.41	12.34	0.79	0.83	5.22	25.25	4.886

Hot Stabilized Idle Emission Factors (Gm/Hr)

Idle CO:	269.98	342.97	395.36	357.55	277.09	20.12	32.85	49.90	465.39	271.035

DRIVER calls completed.

1988 - 8hr MICROSCALE MOBILE SOURCE EMISSIONS - ROUTE 57 EIR/EIS AGAWAM, MA.
MOBILE4.1(4Nov91)

M 10 Warning: RLFLAG=2 & PRTFLG not = 1 or 4, so RLFLAG input records skipped.
M111 Error: The calculated exhaust temperature 31.3 is < daily min temp or > daily max temp

I/M program selected:

Start year (January 1):	1983
Pre-1981 MYR stringency rate:	12%
First model year covered:	1974
Last model year covered:	2020
Waiver rate (pre-1981):	1.%
Waiver rate (1981 and newer):	1.%
Compliance Rate:	85.%
Inspection type:	Computerized decentralized
Inspection frequency	Annual
Vehicle types covered:	LDGV - Yes
	LDGT1 - Yes
	LDGT2 - Yes
	HDGV - No
1981 & later MYR test type:	Idle

Minimum Temp: 29. (F) Maximum Temp: 30. (F)
Period 1 RVP: 13.5 Period 2 RVP: 13.5 Period 2 Start Yr: 1989

VOC HC emission factors include evaporative HC emission factors.

Cal. Year: 1988 I/M Program: Yes Ambient Temp: 31.3 (F) Region: Low
Anti-tam. Program: No Operating Mode: 20.6 / 27.3 / 20.6 Altitude: 500. Ft.

Veh. Type:	LDGV	LDGT1	LDGT2	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
Veh. Speeds:	35.0	35.0	35.0		35.0	35.0	35.0	35.0	35.0	
VMT Mix:	0.637	0.159	0.076		0.035	0.013	0.003	0.068	0.009	
Composite Emission Factors (Gm/Mile)										
Exhaust CO:	21.36	25.05	30.72	26.88	77.05	0.87	0.96	7.59	17.86	23.291
Hot Stabilized Idle Emission Factors (Gm/Hr)										
Idle CO:	821.76	1072.09	1126.61	1089.67	504.13			52.46	310.44	804.051

M111 Error: The calculated exhaust temperature 31.3 is < daily min temp or > daily max temp

Cal. Year: 1988 I/M Program: Yes Ambient Temp: 31.3 (F) Region: Low
Anti-tam. Program: No Operating Mode: 20.6 / 27.3 / 20.6 Altitude: 500. Ft.

Veh. Type:	LDGV	LDGT1	LDGT2	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
Veh. Speeds:	40.0	40.0	40.0		40.0	40.0	40.0	40.0	40.0	
VMT Mix:	0.637	0.159	0.076		0.035	0.013	0.003	0.068	0.009	
Composite Emission Factors (Gm/Mile)										
Exhaust CO:	18.26	21.22	25.99	22.76	71.31	0.79	0.87	6.88	15.46	20.076
Hot Stabilized Idle Emission Factors (Gm/Hr)										
Idle CO:	821.76	1072.09	1126.61	1089.67	504.13	18.70	30.69	52.46	310.44	804.051

M111 Error: The calculated exhaust temperature 31.3 is < daily min temp or > daily max temp

Cal. Year: 1988 I/M Program: Yes Ambient Temp: 31.3 (F) Region: Low
Anti-tam. Program: No Operating Mode: 20.6 / 27.3 / 20.6 Altitude: 500. Ft.

Veh. Type:	LDGV	LDGT1	LDGT2	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
Veh. Speeds:	45.0	45.0	45.0		45.0	45.0	45.0	45.0	45.0	
VMT Mix:	0.637	0.159	0.076		0.035	0.013	0.003	0.068	0.009	
Composite Emission Factors (Gm/Mile)										
Exhaust CO:	16.14	18.84	22.79	20.12	69.72	0.75	0.82	6.52	13.94	18.012
Hot Stabilized Idle Emission Factors (Gm/Hr)										
Idle CO:	821.76	1072.09	1126.61	1089.67	504.13	18.70	30.69	52.46	310.44	804.051

DRIVER calls completed.

1993 - 8hr MICROSCALE MOBILE SOURCE EMISSIONS - ROUTE 57 EIR/EIS AGAWAM, MA.
MOBILE4.1(4Nov91)

M 10 Warning: RLFLAG=2 & PRTFLG not = 1 or 4, so RLFLAG input records skipped.
M111 Error: The calculated exhaust temperature 31.3 is < daily min temp or > daily max temp
M120 Warning: MOBILE4.1 does not model most 1993 and later Clean Air Act requirements; Emission Factors for CY 1993 or later are affected.

I/M program selected:

Start year (January 1):	1983
Pre-1981 MYR stringency rate:	12%
First model year covered:	1979
Last model year covered:	2020
Waiver rate (pre-1981):	1.%
Waiver rate (1981 and newer):	1.%
Compliance Rate:	85.%
Inspection type:	Computerized decentralized
Inspection frequency	Annual
Vehicle types covered:	LDGV - Yes
	LDGT1 - Yes
	LDGT2 - Yes
	HDGV - No
1981 & later MYR test type:	Idle

Minimum Temp: 29. (F) Maximum Temp: 30. (F)
Period 1 RVP: 13.5 Period 2 RVP: 13.5 Period 2 Start Yr: 1989

VOC HC emission factors include evaporative HC emission factors.

Cal. Year: 1993 I/M Program: Yes Ambient Temp: 31.3 (F) Region: Low
Anti-tam. Program: No Operating Mode: 20.6 / 27.3 / 20.6 Altitude: 500. Ft.

Veh. Type:	LDGV	LDGT1	LDGT2	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
Veh. Speeds:	35.0	35.0	35.0		35.0	35.0	35.0	35.0	35.0	
VMT Mix:	0.610	0.183	0.077		0.035	0.006	0.002	0.080	0.008	
Composite Emission Factors (Gm/Mile)										
Exhaust CO:	12.84	15.41	18.38	16.29	42.84	0.95	1.09	6.70	16.92	14.229
Hot Stabilized Idle Emission Factors (Gm/Hr)										
Idle CO:	493.46	576.26	684.97	608.58	374.90	22.62	33.96	50.93	303.37	478.908

M111 Error: The calculated exhaust temperature 31.3 is < daily min temp or > daily max temp

Cal. Year: 1993 I/M Program: Yes Ambient Temp: 31.3 (F) Region: Low
Anti-tam. Program: No Operating Mode: 20.6 / 27.3 / 20.6 Altitude: 500. Ft.

Veh. Type:	LDGV	LDGT1	LDGT2	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
Veh. Speeds:	40.0	40.0	40.0		40.0	40.0	40.0	40.0	40.0	
VMT Mix:	0.610	0.183	0.077		0.035	0.006	0.002	0.080	0.008	
Composite Emission Factors (Gm/Mile)										
Exhaust CO:	10.41	12.50	14.94	13.23	39.65	0.86	0.99	6.07	14.56	11.772
Hot Stabilized Idle Emission Factors (Gm/Hr)										
Idle CO:	493.46	576.26	684.97	608.58	374.90	22.62	33.96	50.93	303.37	478.908

M111 Error: The calculated exhaust temperature 31.3 is < daily min temp or > daily max temp

Cal. Year: 1993 I/M Program: Yes Ambient Temp: 31.3 (F) Region: Low
Anti-tam. Program: No Operating Mode: 20.6 / 27.3 / 20.6 Altitude: 500. Ft.

Veh. Type:	LDGV	LDGT1	LDGT2	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
Veh. Speeds:	45.0	45.0	45.0		45.0	45.0	45.0	45.0	45.0	
VMT Mix:	0.610	0.183	0.077		0.035	0.006	0.002	0.080	0.008	
Composite Emission Factors (Gm/Mile)										
Exhaust CO:	8.61	10.50	12.42	11.07	38.76	0.82	0.94	5.76	13.08	10.043
Hot Stabilized Idle Emission Factors (Gm/Hr)										
Idle CO:	493.46	576.26	684.97	608.58	374.90	22.62	33.96	50.93	303.37	478.908

M111 Error: The calculated exhaust temperature 31.3 is < daily min temp or > daily max temp

Cal. Year: 1993 I/M Program: Yes Ambient Temp: 31.3 (F) Region: Low
Anti-tam. Program: No Operating Mode: 20.6 / 27.3 / 20.6 Altitude: 500. Ft.

Veh. Type:	LDGV	LDGT1	LDGT2	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
Veh. Speeds:	50.0	50.0	50.0		50.0	50.0	50.0	50.0	50.0	
VMT Mix:	0.610	0.183	0.077		0.035	0.006	0.002	0.080	0.008	
Composite Emission Factors (Gm/Mile)										
Exhaust CO:	10.21	12.66	14.83	13.31	40.04	0.81	0.93	5.71	16.46	11.670

Hot Stabilized Idle Emission Factors (Gm/Hr)

Idle	CO:	493.46	576.26	684.97	608.58	374.90	22.62	33.96	50.93	303.37	478.908

DRIVER calls completed.

M 10 Warning: RLFLAG=2 & PRTFLG not = 1 or 4, so RLFLAG input records skipped.
M111 Error: The calculated exhaust temperature 31.3 is < daily min temp or > daily max temp
M120 Warning: MOBILE4.1 does not model most 1993 and later Clean Air Act requirements; Emission Factors for CY 1993 or later are affected.

I/M program selected:

Start year (January 1):	1983
Pre-1981 MYR stringency rate:	12%
First model year covered:	1999
Last model year covered:	2020
Waiver rate (pre-1981):	1.%
Waiver rate (1981 and newer):	1.%
Compliance Rate:	85.%
Inspection type:	Computerized decentralized
Inspection frequency	Annual
Vehicle types covered:	LDGV - Yes
	LDGT1 - Yes
	LDGT2 - Yes
	HDGV - No
1981 & later MYR test type:	Idle

Minimum Temp: 29. (F) Maximum Temp: 30. (F)
Period 1 RVP: 13.5 Period 2 RVP: 13.5 Period 2 Start Yr: 1989

VOC HC emission factors include evaporative HC emission factors.

Cal. Year: 2013 I/M Program: Yes Ambient Temp: 31.3 (F) Region: Low
Anti-tam. Program: No Operating Mode: 20.6 / 27.3 / 20.6 Altitude: 500. Ft.

Veh. Type:	LDGV	LDGT1	LDGT2	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
Veh. Speeds:	30.0	30.0	30.0		30.0	30.0	30.0	30.0	30.0	
VMT Mix:	0.551	0.210	0.081		0.036	0.002	0.004	0.111	0.005	
Composite Emission Factors (Gm/Mile)										
Exhaust CO:	7.24	9.39	10.97	9.83	15.08	0.92	0.99	7.07	20.31	8.292
Hot Stabilized Idle Emission Factors (Gm/Hr)										
Idle CO:	188.41	223.51	277.17	238.44	277.09	17.19	28.81	49.90	303.37	190.539

M111 Error: The calculated exhaust temperature 31.3 is < daily min temp or > daily max temp

Cal. Year: 2013 I/M Program: Yes Ambient Temp: 31.3 (F) Region: Low
Anti-tam. Program: No Operating Mode: 20.6 / 27.3 / 20.6 Altitude: 500. Ft.

Veh. Type:	LDGV	LDGT1	LDGT2	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
Veh. Speeds:	35.0	35.0	35.0		35.0	35.0	35.0	35.0	35.0	
VMT Mix:	0.551	0.210	0.081		0.036	0.002	0.004	0.111	0.005	
Composite Emission Factors (Gm/Mile)										
Exhaust CO:	5.27	6.81	7.95	7.13	13.21	0.79	0.85	6.12	16.92	6.229
Hot Stabilized Idle Emission Factors (Gm/Hr)										
Idle CO:	188.41	223.51	277.17	238.44	277.09	17.19	28.81	49.90	303.37	190.539

M111 Error: The calculated exhaust temperature 31.3 is < daily min temp or > daily max temp

Cal. Year: 2013 I/M Program: Yes Ambient Temp: 31.3 (F) Region: Low
Anti-tam. Program: No Operating Mode: 20.6 / 27.3 / 20.6 Altitude: 500. Ft.

Veh. Type:	LDGV	LDGT1	LDGT2	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
Veh. Speeds:	40.0	40.0	40.0		40.0	40.0	40.0	40.0	40.0	
VMT Mix:	0.551	0.210	0.081		0.036	0.002	0.004	0.111	0.005	
Composite Emission Factors (Gm/Mile)										
Exhaust CO:	3.80	4.87	5.69	5.10	12.22	0.72	0.77	5.55	14.56	4.714
Hot Stabilized Idle Emission Factors (Gm/Hr)										
Idle CO:	188.41	223.51	277.17	238.44	277.09	17.19	28.81	49.90	303.37	190.539

M111 Error: The calculated exhaust temperature 31.3 is < daily min temp or > daily max temp

Cal. Year: 2013 I/M Program: Yes Ambient Temp: 31.3 (F) Region: Low
Anti-tam. Program: No Operating Mode: 20.6 / 27.3 / 20.6 Altitude: 500. Ft.

Veh. Type:	LDGV	LDGT1	LDGT2	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
Veh. Speeds:	45.0	45.0	45.0		45.0	45.0	45.0	45.0	45.0	
VMT Mix:	0.551	0.210	0.081		0.036	0.002	0.004	0.111	0.005	
Composite Emission Factors (Gm/Mile)										
Exhaust CO:	2.65	3.36	3.93	3.52	11.95	0.68	0.73	5.26	13.08	3.573

Hot Stabilized Idle Emission Factors (Gm/Hr)

Idle CO:	188.41	223.51	277.17	238.44	277.09	17.19	28.81	49.90	303.37	190.539

Mill Error: The calculated exhaust temperature 31.3 is < daily min temp or > daily max temp

Cal. Year: 2013 I/M Program: Yes Ambient Temp: 31.3 (F) Region: Low
Anti-tam. Program: No Operating Mode: 20.6 / 27.3 / 20.6 Altitude: 500. Ft.

Veh. Type:	LDGV	LDGT1	LDGT2	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
Veh. Speeds:	50.0	50.0	50.0		50.0	50.0	50.0	50.0	50.0	
VMT Mix:	0.551	0.210	0.081		0.036	0.002	0.004	0.111	0.005	

Composite Emission Factors (Gm/Mile)

Exhaust CO:	2.74	3.44	4.02	3.61	12.34	0.68	0.73	5.22	16.46	3.675

Hot Stabilized Idle Emission Factors (Gm/Hr)

Idle CO:	188.41	223.51	277.17	238.44	277.09	17.19	28.81	49.90	303.37	190.539

DRIVER calls completed.

SECTION C

MESOSCALE TRAFFIC DATA

AND WORKSHEETS

ROUTE 57 - AGAWAM

8/31/88
PROJ. 6470.210

EXISTING TRAFFIC DATA

ROAD SEGMENT	A.D.T.	AVERAGE TRAVEL SPEED (m.p.h.)	# LANES
OLD ROUTE 57			
Route 187 - N. West Street	13790	35	2
N. West St. - New Route 57	9465	45	2
ROUTE 187			
New Route 57 - Shoemaker	9040	40	2
Shoemaker - Old Route 57	7840	40	2
SOUTH WEST ST.			
New Route 57 - Old Route 57	1450	40	2

ROUTE 57 - AGAWAM

10/25/88
PROJ. 6470.210

ALTERNATIVE I - 1993

PROJECTED TRAFFIC DATA

ROAD SEGMENT	A.D.T.	AVERAGE TRAVEL SPEED (m.p.h.)	# LANES
OLD ROUTE 57			
Route 187 - N. West Street	14820	35	2
N. West St. - New Route 57	10830	45	2
ROUTE 187			
New Route 57 - Shoemaker	12400	35	2
Shoemaker - Old Route 57	12230	35	2
SOUTH WEST ST.			
New Route 57 - Old Route 57	1450	40	2
NEW ROUTE 57			
Route 187 - N. West St.	-	-	-
N. West St. - Old Route 57	-	-	-

ROUTE 57 - AGAWAM

10/25/88
PROJ. 6470.210

ALTERNATIVE I - 2013

PROJECTED TRAFFIC DATA

ROAD SEGMENT	A.D.T.	AVERAGE TRAVEL SPEED (m.p.h.)	# LANES
OLD ROUTE 57			
Route 187 - N. West Street	20810	30	2
N. West St. - New Route 57	16010	35	2
ROUTE 187			
New Route 57 - Shoemaker	18010	30	2
Shoemaker - Old Route 57	18230	30	2
SOUTH WEST ST.			
New Route 57 - Old Route 57	2360	40	2
NEW ROUTE 57			
Route 187 - N. West St.	-	-	-
N. West St. - Old Route 57	-	-	-

ROUTE 57 - AGAWAM

10/25/88
PROJ. 6470.210

ALTERNATIVE II & III - 1993

PROJECTED TRAFFIC DATA

ROAD SEGMENT	A.D.T.	AVERAGE TRAVEL SPEED (m.p.h.)	# LANES
OLD ROUTE 57			
Route 187 - N. West Street	5310	40	2
N. West St. - New Route 57	2740	45	2
ROUTE 187			
New Route 57 - Shoemaker	5070	40	2
Shoemaker - Old Route 57	7060	40	2
SOUTH WEST ST.			
New Route 57 - Old Route 57	2830	40	2
NEW ROUTE 57			
Route 187 - N. West St.	12190	50	4
N. West St. - Old Route 57	9140	50	2

ROUTE 57 - AGAWAM

10/25/88
PROJ. 6470.210

ALTERNATIVE II & III - 2013

PROJECTED TRAFFIC DATA

ROAD SEGMENT	A.D.T.	AVERAGE TRAVEL SPEED (m.p.h.)	# LANES
OLD ROUTE 57			
Route 187 - N. West Street	7060	40	2
N. West St. - New Route 57	3590	45	2
ROUTE 187			
New Route 57 - Shoemaker	6890	40	2
Shoemaker - Old Route 57	10630	40	2
SOUTH WEST ST.			
New Route 57 - Old Route 57	4260	40	2
NEW ROUTE 57			
Route 187 - N. West St.	18570	50	4
N. West St. - Old Route 57	14650	45	2

ROUTE 57 - AGAWAM

6/4/90
PROJ. 6470.210

ALTERNATIVE III

PROJECTED TRAFFIC DATA

LINK NAME	DISTANCE	AVERAGE TRAVEL SPEED (m.p.h.)	1993 ADT	2013 ADT
NEW ROUTE 57 (S. West St. to Old Rte. 57)	.838	50	9,140	14,650
NEW ROUTE 57 (Rte. 187 to S. West. St.)	1.051	50	12,190	18,570
SOUTH WEST ST. (New Rte. 57 to Old Rte. 57)	.502	40	2,830	4,260
ROUTE 187 (Shoemaker Ln. to Old Rte. 57)	.488	40	7,060	10,630
ROUTE 187 (New Rte. 57 to Shoemaker Ln.)	.294	40	5,070	6,890
OLD ROUTE 57 (Rte. 187 to West St.)	.862	40	5,310	7,060
OLD ROUTE 57 (West St. to New Rte. 57)	1.004	45	2,740	3,590

ROUTE 57 - AGAWAM

6/4/90
PROJ. 6470.210

ALTERNATIVE III WITH SEPARATION (III(a))

PROJECTED TRAFFIC DATA

LINK NAME	DISTANCE	AVERAGE TRAVEL SPEED (m.p.h.)	1993 ADT	2013 ADT
NEW ROUTE 57 (Route 187 to Old Rte. 57)	1.889	50	13,570	21,890
SOUTH WEST ST. (New Rte. 57 to Old Rte. 57)	.502	40	3,570	4,870
ROUTE 187 (Shoemaker Ln. to Old Rte. 57)	.488	40	11,480	16,025
ROUTE 187 (New Rte. 57 to Shoemaker Ln.)	.294	40	13,225	19,920
OLD ROUTE 57 (Rte. 187 to West St.)	.862	40	8,850	11,960
OLD ROUTE 57 (West St. to New Rte. 57)	1.004	45	5,875	6,390

ROUTE 57 - AGAWAM

6/4/90
PROJ. 6470.210

ALTERNATIVE IV

PROJECTED TRAFFIC DATA

LINK NAME	DISTANCE	AVERAGE TRAVEL SPEED (m.p.h.)	1993 ADT	2013 ADT
NEW ROUTE 57 (S. West St. to Old Rte. 57)	.857	50	9,140	14,650
NEW ROUTE 57 (Rte. 187 to S. West. St.)	1.113	50	12,190	18,570
SOUTH WEST ST. (New Rte. 57 to Old Rte. 57)	.398	40	2,830	4,260
ROUTE 187 (Shoemaker Ln. to Old Rte. 57)	.488	40	7,060	10,630
ROUTE 187 (New Rte. 57 to Shoemaker Ln.)	.294	40	5,070	6,890
OLD ROUTE 57 (Rte. 187 to West St.)	.862	40	5,310	7,060
OLD ROUTE 57 (West St. to New Rte. 57)	.928	45	2,740	3,590
NEW ROUTE 57 (Old Rte. 57 in Agawam to Old Rte. 57 in Southwick)	.429	50	11,880	18,240

ROUTE 57 - AGAWAM

6/4/90
PROJ. 6470.210

ALTERNATIVE IV WITH SEPARATION (IV(a))

PROJECTED TRAFFIC DATA

LINK NAME	DISTANCE	AVERAGE TRAVEL SPEED (m.p.h.)	1993 ADT	2013 ADT
NEW ROUTE 57 (Route 187 to Old Rte. 57)	1.970	50	13,570	21,890
SOUTH WEST ST. (New Rte. 57 to Old Rte. 57)	.398	40	3,570	4,870
ROUTE 187 (Shoemaker Ln. to Old Rte. 57)	.488	40	11,480	16,025
ROUTE 187 (New Rte. 57 to Shoemaker Ln.)	.294	40	13,225	19,920
OLD ROUTE 57 (Rte. 187 to West St.)	.862	40	8,850	11,960
OLD ROUTE 57 (West St. to New Rte. 57)	.928	45	5,875	6,390
NEW ROUTE 57 (Old Rte. 57 in Agawam to Old Rte. 57 in Southwick)	.429	50	19,445	28,280

MESOSCALE TRAFFIC DATA WORKSHEET

LINK NAME: NEW ROUTE 57 (Route 187 - S. West Street)
ADT IS TWO WAY VOLUME

Case	Link Distance (miles)	ADT	Average Speed (mph)	Emissions Rate (g/mile-veh.)			Total Daily Pollutant Emissions (kg/day)		
				NMHC	CO	NO_x	NMHC	CO	NO_x
1988 Existing	NA	NA	NA	NA	NA	NA	NA	NA	NA
1993 Alt. I	NA	NA	NA	NA	NA	NA	NA	NA	NA
~~1993 Alt. II~~	~~1.098~~	~~12,190~~	~~50~~	~~1.52~~	~~8.27~~	~~2.33~~	~~20.34~~	~~110.69~~	~~31.19~~
1993 Alt. III	1.051	12,190	50	1.52	8.27	2.33	19.47	105.95	29.85
1993 Alt. III (a)	1.051	13,570	50	1.52	8.27	2.33	21.68	117.95	33.23
1993 Alt. IV	1.113	12,190	50	1.52	8.27	2.33	20.62	112.20	31.61
1993 Alt. IV (a)	1.113	13,570	50	1.52	8.27	2.33	22.96	124.91	35.19
2013 Alt. I	NA	NA	NA	NA	NA	NA	NA	NA	NA
~~2013 Alt. II~~	~~1.098~~	~~18,570~~	~~50~~	~~0.98~~	~~2.36~~	~~1.52~~	~~19.98~~	~~48.12~~	~~30.99~~
2013 Alt. III	1.051	18,570	50	0.98	2.36	1.52	19.13	46.06	29.67
2013 Alt. III (a)	1.051	21,890	50	0.98	2.36	1.52	22.55	54.30	34.97
2013 Alt. IV	1.113	18,570	50	0.98	2.36	1.52	20.26	48.78	31.42
2013 Alt. IV (a)	1.113	21,890	50	0.98	2.36	1.52	23.88	57.50	37.03

(a) = S. West St. / New Route 57 Grade-Separated

MESOSCALE TRAFFIC DATA WORKSHEET

LINK NAME: NEW ROUTE 57 (S. West Street - Existing Route 57)
ADT IS TWO WAY VOLUME

Case	Link Distance (miles)	ADT	Average Speed (mph)	Emissions Rate (g/mile-veh.)			Total Daily Pollutant Emissions (kg/day)		
				NMHC	CO	NO_x	NMHC	CO	NO_x
1988 Existing	NA	NA	NA	NA	NA	NA	NA	NA	NA
1993 Alt. I	NA	NA	NA	NA	NA	NA	NA	NA	NA
~~1993 Alt. II~~	~~.876~~	~~9,140~~	~~50~~	~~1.52~~	~~8.27~~	~~2.33~~	~~12.17~~	~~66.21~~	~~18.66~~
1993 Alt. III	.838	9,140	50	1.52	8.27	2.33	11.64	63.34	17.85
1993 Alt. III (a)	.838	13,570	50	1.52	8.27	2.33	17.28	94.04	26.50
1993 Alt. IV	.857	9,140	50	1.52	8.27	2.33	11.91	64.78	18.25
1993 Alt. IV (a)	.857	13,570	50	1.52	8.27	2.33	17.68	96.18	27.10
2013 Alt. I	NA	NA	NA	NA	NA	NA	NA	NA	NA
~~2013 Alt. II~~	~~.876~~	~~14,650~~	~~45~~	~~1.03~~	~~2.30~~	~~1.41~~	~~13.22~~	~~29.52~~	~~18.10~~
2013 Alt. III	.838	14,650	45	1.03	2.30	1.41	12.65	28.24	17.31
2013 Alt. III (a)	.838	21,890	50	0.98	2.36	1.52	17.98	43.29	27.88
2013 Alt. IV	.857	14,650	45	1.03	2.30	1.41	12.93	28.88	17.70
2013 Alt. IV (a)	.857	21,890	50	0.98	2.36	1.52	18.38	44.27	28.51

(a) = S. West St. / New Route 57 Grade-Separated

MESOSCALE TRAFFIC DATA WORKSHEET

LINK NAME: SOUTH WEST STREET (New Route 57 - Existing Route 57)
ADT IS TWO WAY VOLUME

Case	Link Distance (miles)	ADT	Average Speed (mph)	Emissions Rate (g/mile-veh.)			Total Daily Pollutant Emissions (kg/day)		
				NMHC	CO	NO_x	NMHC	CO	NO_x
1988 Existing	.748	1,450	40	4.08	17.12	2.99	4.43	18.57	3.24
1993 Alt. I	.748	1,450	40	1.68	8.03	2.08	1.82	8.71	2.26
1993 Alt. III, IV	.748	2,830	40	1.68	8.03	2.08	3.56	17.00	4.40
1993 Alt. III, IV (a)	.748	3,570	40	1.68	8.03	2.08	4.49	21.44	5.55
2013 Alt. I	.748	2,360	40	1.12	2.91	1.39	1.98	5.14	2.45
2013 Alt. III, IV	.748	4,260	40	1.12	2.91	1.39	3.57	9.27	4.43
2013 Alt. III, IV (a)	.748	4,870	40	1.12	2.91	1.39	4.08	10.60	5.06

(a) = S. West St. / New Route 57 Grade-Separated

MESOSCALE TRAFFIC DATA WORKSHEET

LINK NAME: ROUTE 187 (Shoemaker Lane - Existing Route 57)
ADT IS TWO WAY VOLUME

Case	Link Distance (miles)	ADT	Average Speed (mph)	Emissions Rate (g/mile-veh.)			Total Daily Pollutant Emissions (kg/day)		
				NMHC	CO	NO_x	NMHC	CO	NO_x
1988 Existing	.488	7,840	40	4.08	17.12	2.99	15.61	65.50	11.44
1993 Alt. I	.488	12,230	35	1.84	9.44	2.07	10.98	56.34	12.35
1993 Alt. III, IV	.488	7,060	40	1.68	8.03	2.08	5.79	27.67	7.17
1993 Alt. III, IV (a)	.488	11,480	40	1.68	8.03	2.08	9.41	44.99	11.65
2013 Alt. I	.488	18,230	30	1.38	4.89	1.44	12.28	43.50	12.81
2013 Alt. III, IV	.488	10,630	40	1.12	2.91	1.39	5.81	15.10	7.21
2013 Alt. III, IV (a)	.488	16,025	40	1.12	2.91	1.39	8.76	22.76	10.87

(a) = S. West St. / New Route 57 Grade-Separated

MESOSCALE TRAFFIC DATA WORKSHEET

LINK NAME: NEW ROUTE 187 (New Route 57 - Shoemaker Lane)
ADT IS TWO WAY VOLUME

Case	Link Distance (miles)	ADT	Average Speed (mph)	Emissions Rate (g/mile-veh.)			Total Daily Pollutant Emissions (kg/day)		
				NMHC	CO	NO_x	NMHC	CO	NO_x
1988 Existing	.294	9,040	40	4.08	17.12	2.99	10.84	45.50	7.95
1993 Alt. I	.294	12,400	35	1.84	9.44	2.07	6.71	34.41	7.55
1993 Alt. III, IV	.294	5,070	40	1.68	8.03	2.08	2.50	11.97	3.10
1993 Alt. III, IV (a)	.294	13,225	40	1.68	8.03	2.08	6.53	31.22	8.09
2013 Alt. I	.294	18,010	30	1.38	4.89	1.44	7.31	25.89	7.62
2013 Alt. III, IV	.294	6,890	40	1.12	2.91	1.39	2.27	5.89	2.82
2013 Alt. III, IV (a)	.294	19,920	40	1.12	2.91	1.39	6.56	17.04	8.14

(a) = S. West St. / New Route 57 Grade-Separated

MESOSCALE TRAFFIC DATA WORKSHEET

LINK NAME: NEW ROUTE 57 (Route 187 - West Street)
ADT IS TWO WAY VOLUME

Case	Link Distance (miles)	ADT	Average Speed (mph)	Emissions Rate (g/mile-veh.)			Total Daily Pollutant Emissions (kg/day)		
				NMHC	CO	NO_x	NMHC	CO	NO_x
1988 Existing	.862	13,790	35	4.39	19.71	2.94	52.18	234.29	34.95
1993 Alt. I	.862	14,820	35	1.84	9.44	2.07	23.51	120.59	26.44
1993 Alt. III, IV	.862	5,310	40	1.68	8.03	2.08	7.69	36.76	9.52
1993 Alt. III, IV (a)	.862	8,850	40	1.68	8.03	2.08	12.82	61.26	15.87
2013 Alt. I	.862	20,810	30	1.38	4.89	1.44	24.75	87.72	25.83
2013 Alt. III, IV	.862	7,060	40	1.12	2.91	1.39	6.82	17.71	8.46
2013 Alt. III, IV (a)	.862	11,960	40	1.12	2.91	1.39	11.55	30.00	14.33

(a) = S. West St. / New Route 57 Grade-Separated

MESOSCALE TRAFFIC DATA WORKSHEET

LINK NAME: OLD ROUTE 57 (West Street - New Route 57)
ADT IS TWO WAY VOLUME

Case	Link Distance (miles)	ADT	Average Speed (mph)	Emissions Rate (g/mile-veh.)			Total Daily Pollutant Emissions (kg/day)		
				NMHC	CO	NO_x	NMHC	CO	NO_x
1988 Existing	1.004	9,465	45	3.86	15.51	3.10	36.68	147.39	29.46
1993 Alt. I	1.004	10,830	45	1.56	7.10	2.14	16.96	77.20	23.27
1993 Alt. . III, IV	1.004	2,740	45	1.56	7.10	2.14	4.29	19.53	5.89
1993 Alt. III, IV (a)	1.004	5,875	45	1.56	7.10	2.14	9.20	41.88	12.62
2013 Alt. I	1.004	16,010	35	1.23	3.74	1.39	19.77	60.12	22.34
2013 Alt. III, IV	1.004	3,590	45	1.03	2.30	1.41	3.71	8.29	5.08
2013 Alt. III, IV (a)	1.004	6,390	45	1.03	2.30	1.41	6.61	14.76	9.05

(a) = S. West St. / New Route 57 Grade-Separated

MESOSCALE EMISSIONS

(kg/day)

Case	CO	NMHC	NO_x
1988 Existing	511.25	119.74	87.04
1993 Alt. I	297.25	59.98	71.87
~~1993 Alt. II~~	~~289.83~~	~~56.34~~	~~79.93~~
1993 Alt. III	282.22	54.94	77.78
1993 Alt. III (GS)	412.78	81.41	113.51
1993 Alt. IV	289.91	56.36	79.94
1993 Alt. IV (GS)	421.88	83.09	116.07
2013 Alt. I	222.37	66.09	71.05
~~2013 Alt. II~~	~~133.90~~	~~55.30~~	~~77.09~~
2013 Alt. III	130.56	53.96	74.98
2013 Alt. III (GS)	192.75	78.09	110.30
2013 Alt. IV	133.92	55.37	77.12
2013 Alt. IV (GS)	196.93	79.82	112.99

SECTION D

MICROSCALE CARBON MONOXIDE RESULTS - SAMPLE CAL3QHC MODEL OUTPUT

Input parameters for CAL3QHC

- Worst case meteorological conditions of Pasquill-Gifford Class D stability, a 1.0 m/s wind speed, the worst case wind direction (determined by analyzing all directions in 10 degree increments), a mixing height of 1000 meters and a surface roughness length of 108 cm (for low-density residential areas).

- A receptor height of 1.8 meters.

- A source height of .333 meters.

- CO background levels of 3.0 ppm (1-hour), 2.0 ppm (8-hour), applicable for all study years as approved by the Massachusetts DEP.[5]

The attached pages present a sample of the computer model output. Output for all conditions analyzed for the project are on file at the Massachusetts Highway Department.

---

[5] Personal Communication, Mr. Michael Scherer, Massachusetts DEP, Division of Air Quality Control, Boston, MA, September 30, 1988.

JOB: OLD ROUTE 57 AND ROUTE 187 RUN: 1988 EXISTING-1 HOUR
DATE: 07/16/92
TIME: 12:13:14

SITE & METEOROLOGICAL VARIABLES

VS = 0.0 CM/S VD = 0.0 CM/S Z0 = 108. CM
U = 1.0 M/S CLAS = 4 (D) ATIM = 60. MINUTES MIXH = 1000. M AMB = 0.0 PPM

LINK VARIABLES

LINK DESCRIPTION	LINK COORDINATES (M) X1	Y1	X2	Y2	LENGTH (M)	BRG (DEG)	TYPE	VPH	EF (G/MI)	H (M)	W (M)	V/C	QUEUE (VEH)
1. OLD 57 FF (E OF INT)	0.0	0.0	914.4	0.0	914.	90.	AG	1585.	31.1	0.3	13.3		
2. OLD 57 FF (W OF INT)	0.0	0.0	-914.4	0.0	914.	270.	AG	1307.	36.4	0.3	13.3		
3. ROUTE 187 FF	0.0	914.4	0.0	-914.4	1829.	180.	AG	761.	31.1	0.3	13.3		
4. RT. 187 NB Q-TR	1.8	-9.1	1.8	-65.9	57.	180.	AG	2721.	100.0	0.3	10.0	1.00	9.5
5. RT. 187 NB Q-LT	-1.8	-9.1	-1.8	-21.3	12.	180.	AG	2902.	100.0	0.3	10.0	0.47	2.0
6. RT. 187 SB Q-TR	-5.5	9.1	-5.5	24.4	15.	360.	AG	2902.	100.0	0.3	10.0	0.58	2.5
7. RT. 187 SB Q-LT	-1.8	9.1	-1.8	29.4	20.	360.	AG	2993.	100.0	0.3	10.0	0.77	3.4
8. OLD RT. 57 WB Q-TR	7.6	3.8	65.2	3.8	58.	90.	AG	1723.	100.0	0.3	10.0	0.93	9.6
9. OLD RT. 57 WB Q-LT	7.6	0.0	11.9	0.0	4.	90.	AG	1723.	100.0	0.3	10.0	0.11	0.7
10. OLD RT. 57 EB Q-TR	-12.2	-3.7	-33.0	-3.7	21.	270.	AG	1723.	100.0	0.3	10.0	0.50	3.5
11. OLD RT. 57 EB Q-LT	-12.2	0.0	-14.1	0.0	2.	270.	AG	1723.	100.0	0.3	10.0	0.05	0.3

RECEPTOR LOCATIONS

RECEPTOR	COORDINATES (M) X	Y	Z
1. SCHOOLYARD	14.5	-16.8	1.8
2. L & A REALTORS	-16.0	-49.5	1.8
3. BAYBANK ATM	-21.3	-22.1	1.8
4. FURNITURE STORE	-18.3	25.1	1.8
5. PRIDE GAS STATION	27.4	18.3	1.8

JOB: OLD ROUTE 57 AND ROUTE 187 RUN: 1988 EXISTING-1 HOUR

MODEL RESULTS

REMARKS : In search of the angle corresponding to the maximum concentration, only the first angle, of the angles with same maximum concentrations, is indicated as maximum.

WIND ANGLE RANGE: 0.-360.

WIND ANGLE (DEGR)	CONCENTRATION (PPM) REC1	REC2	REC3	REC4	REC5
0.	5.7	4.4	5.1	0.5	0.3
10.	4.4	6.6	6.8	0.7	0.1
20.	3.9	8.1	7.7	0.7	0.0
30.	4.0	8.7	7.2	0.6	0.0
40.	4.1	8.6	6.5	0.6	0.0
50.	4.2	7.9	7.2	0.8	0.0
60.	3.9	6.8	8.9	1.5	0.0
70.	3.2	6.5	10.4	3.0	0.1
80.	2.3	6.2	9.8	5.6	0.5
90.	1.3	5.8	7.8	9.3	1.4
100.	0.4	5.5	5.9	12.7	2.6
110.	0.1	5.3	4.8	14.9	3.8
120.	0.0	4.7	4.7	15.1	4.6
130.	0.0	3.6	4.7	13.4	4.9
140.	0.0	2.4	4.5	10.9	4.7
150.	0.0	1.4	3.5	9.5	4.6
160.	0.1	0.9	2.2	8.3	4.6
170.	0.6	0.8	1.1	6.9	4.8
180.	2.2	0.6	0.5	4.9	5.3
190.	4.5	0.2	0.1	3.3	6.8
200.	6.7	0.0	0.0	2.4	8.7
210.	7.5	0.0	0.0	1.8	9.7
220.	7.7	0.0	0.0	1.2	9.3
230.	7.7	0.0	0.0	1.0	8.1
240.	8.1	0.0	0.0	0.9	7.0
250.	9.0	0.0	0.0	1.0	6.8
260.	10.8	0.1	0.3	1.1	7.5
270.	12.7	0.4	0.8	0.7	7.2
280.	13.4	0.6	1.2	0.2	5.5
290.	11.7	0.6	1.1	0.0	3.5
300.	9.4	0.6	1.1	0.0	1.8
310.	7.6	0.5	1.4	0.0	0.8
320.	7.2	0.6	2.0	0.0	0.5
330.	8.0	0.9	2.6	0.0	0.4
340.	8.3	1.4	3.3	0.0	0.5
350.	7.3	2.6	4.0	0.2	0.5
360.	5.7	4.4	5.1	0.5	0.3
MAX	13.4	8.7	10.4	15.1	9.7
DEGR.	280	30	70	120	210

JOB: OLD ROUTE 57 AND ROUTE 187 RUN: 1988 EXISTING-8 HOUR
DATE: 07/16/ 92

LINK VARIABLES

LINK DESCRIPTION	LINK COORDINATES (M) X1	Y1	X2	Y2	LENGTH (M)	BRG TYPE (DEG)	VPH	EF (G/MI)	H (M)	W (M)	V/C	QUEUE (VEH)
1. OLD 57 FF (E OF INT)	0.0	0.0	914.4	0.0	914.	90. AG	1204.	20.1	0.3	13.3		
2. OLD 57 FF (W OF INT)	0.0	0.0	-914.4	0.0	914.	270. AG	954.	23.3	0.3	13.3		
3. ROUTE 187 FF	0.0	914.4	0.0	-914.4	1829.	180. AG	621.	20.1	0.3	13.3		
4. RT. 187 NB Q-TR	1.8	-9.1	1.8	-28.6	19.	180. AG	1617.	100.0	0.3	10.0	0.60	3.2
5. RT. 187 NB Q-LT	-1.8	-9.1	-1.8	-15.3	6.	180. AG	1725.	100.0	0.3	10.0	0.24	1.0
6. RT. 187 SB Q-TR	-5.5	9.1	-5.5	22.6	13.	360. AG	1725.	100.0	0.3	10.0	0.52	2.2
7. RT. 187 SB Q-LT	-1.8	9.1	-1.8	29.0	20.	360. AG	1779.	100.0	0.3	10.0	0.76	3.3
8. OLD RT. 57 WB Q-TR	7.6	3.8	28.1	3.8	20.	90. AG	1024.	100.0	0.3	10.0	0.49	3.4
9. OLD RT. 57 WB Q-LT	7.6	0.0	10.8	0.0	3.	90. AG	1024.	100.0	0.3	10.0	0.08	0.5
10. OLD RT. 57 EB Q-TR	-12.2	-3.7	-35.1	-3.7	23.	270. AG	1024.	100.0	0.3	10.0	0.55	3.8
11. OLD RT. 57 EB Q-LT	-12.2	0.0	-13.4	0.0	1.	270. AG	1024.	100.0	0.3	10.0	0.03	0.2

RECEPTOR LOCATIONS

RECEPTOR	COORDINATES (M) X	Y	Z
1. SCHOOLYARD	14.5	-16.8	1.8
2. L & A REALTORS	-16.0	-49.5	1.8
3. BAYBANK ATM	-21.3	-22.1	1.8
4. FURNITURE STORE	-18.3	25.1	1.8
5. PRIDE GAS STATION	27.4	18.3	1.8

JOB: OLD ROUTE 57 AND ROUTE 187 RUN: 1988 EXISTING-8 HOUR

MODEL RESULTS

REMARKS : In search of the angle corresponding to the maximum concentration, only the first angle, of the angles with same maximum concentrations, is indicated as maximum.

WIND ANGLE RANGE: 0.-360.

WIND ANGLE (DEGR)	CONCENTRATION (PPM) REC1	REC2	REC3	REC4	REC5
0.	3.0	2.3	2.9	0.3	0.2
10.	2.4	3.3	3.8	0.4	0.1
20.	1.9	3.6	4.1	0.3	0.0
30.	1.6	3.3	3.8	0.3	0.0
40.	1.1	2.6	3.7	0.3	0.0
50.	0.9	1.6	3.4	0.5	0.0
60.	0.7	0.9	4.0	0.8	0.0
70.	0.7	0.6	4.3	1.4	0.0
80.	0.7	0.6	3.9	2.6	0.2
90.	0.5	0.5	3.0	4.3	0.5
100.	0.2	0.3	2.0	5.9	0.7
110.	0.0	0.3	1.2	7.4	0.7
120.	0.0	0.3	0.6	7.8	0.6
130.	0.0	0.3	0.3	7.4	0.5
140.	0.0	0.3	0.3	5.8	0.5
150.	0.0	0.3	0.3	4.7	0.6
160.	0.0	0.4	0.3	3.5	0.8
170.	0.1	0.4	0.3	2.7	1.3
180.	0.3	0.3	0.2	2.2	1.9
190.	0.4	0.1	0.1	1.7	2.6
200.	0.7	0.0	0.0	1.5	3.7
210.	1.2	0.0	0.0	1.1	4.4
220.	1.9	0.0	0.0	0.8	4.5
230.	2.8	0.0	0.0	0.5	4.1
240.	3.4	0.0	0.0	0.4	3.9
250.	3.9	0.0	0.0	0.5	3.8
260.	4.6	0.0	0.1	0.5	4.1
270.	5.8	0.2	0.4	0.3	3.9
280.	6.6	0.3	0.6	0.1	3.1
290.	6.3	0.3	0.5	0.0	1.8
300.	5.2	0.3	0.6	0.0	0.9
310.	4.3	0.3	0.8	0.0	0.4
320.	3.9	0.3	1.3	0.0	0.2
330.	4.4	0.5	1.7	0.0	0.2
340.	4.5	0.8	2.0	0.0	0.3
350.	3.8	1.4	2.4	0.1	0.3
360.	3.0	2.3	2.9	0.3	0.2
MAX	6.6	3.6	4.3	7.8	4.5
DEGR.	280	20	70	120	220

JOB: OLD ROUTE 57 AND ROUTE 187 RUN: 1993 ALT. 1- 1 HOUR
DATE: 07/16/ 92

LINK VARIABLES

LINK DESCRIPTION	LINK COORDINATES (M) X1	Y1	X2	Y2	LENGTH (M)	BRG (DEG)	TYPE	VPH	EF (G/MI)	H (M)	W (M)	V/C	QUEUE (VEH)
1. OLD 57 FF (E OF INT)	0.0	0.0	914.4	0.0	914.	90.	AG	810.	22.3	0.3	13.3		
2. OLD 57 FF (W OF INT)	0.0	0.0	-914.4	0.0	914.	270.	AG	1334.	22.3	0.3	13.3		
3. ROUTE 187 FF	0.0	914.4	0.0	-914.4	1829.	180.	AG	1089.	22.3	0.3	13.3		
4. RT. 187 NB Q-TR	1.8	-9.1	1.8	-47.0	38.	180.	AG	1605.	100.0	0.3	10.0	0.87	6.3
5. RT. 187 NB Q-LT	-1.8	-9.1	-1.8	-45.5	36.	180.	AG	1322.	100.0	0.3	10.0	0.73	6.1
6. RT. 187 SB Q-TR	-5.5	9.1	-5.5	32.7	24.	360.	AG	1605.	100.0	0.3	10.0	0.64	3.9
7. RT. 187 SB Q-LT	-1.8	9.1	-1.8	16.1	7.	360.	AG	1322.	100.0	0.3	10.0	0.16	1.2
8. OLD RT. 57 WB Q-TR	7.6	3.8	43.7	3.8	36.	90.	AG	1322.	100.0	0.3	10.0	0.73	6.0
9. OLD RT. 57 WB Q-LT	7.6	0.0	9.0	0.0	1.	90.	AG	1322.	100.0	0.3	10.0	0.03	0.2
10. OLD RT. 57 EB Q-TR	-12.2	-3.7	-55.4	-3.7	43.	270.	AG	1322.	100.0	0.3	10.0	0.81	7.2
11. OLD RT. 57 EB Q-LT	-12.2	0.0	-15.0	0.0	3.	270.	AG	1322.	100.0	0.3	10.0	0.06	0.5

RECEPTOR LOCATIONS

RECEPTOR	COORDINATES (M) X	Y	Z
1. SCHOOLYARD	14.5	-16.8	1.8
2. L & A REALTORS	-16.0	-49.5	1.8
3. BAYBANK ATM	-21.3	-22.1	1.8
4. FURNITURE STORE	-18.3	25.1	1.8
5. PRIDE GAS STATION	27.4	18.3	1.8

SECTION E

CORRESPONDENCE WITH DEP

DIVISION OF AIR QUALITY CONTROL

Tech Environmental, Inc.
Reservoir Place
1601 Trapelo Road
Waltham, MA 02154
(617) 890-2220

September 30, 1988 Ref. 347

Mr. Tom Hession
Massachusetts Department of Public Works
State Transportation Building, 4th Floor
10 Park Plaza
Boston, Mass. 02116

Re: Route 57 Improvements, Agawam

Dear Tom:

This letter is intended to serve as written documentation of the meeting held this morning at the Massachusetts DPW offices between MDPW, DEQE, U.S. EPA Region I, Storch Engineers and Tech Environmental. The agreed upon modeling protocol for the air quality analysis of transportation improvements to Route 57 in Agawam/Southwick, Mass. is outlined below.

Introduction

A Negative Declaration for Improvements to Route 57 was prepared by FHWA and DPW in 1979. MDPW is re-evaluating the alternatives for the western portion of the new Route 57 alignment from the Route 187 interchange in Agawam west to the Southwick/Agawam Town Line. The environmental impact review will start out as an EA/Supplemental DEIR and end up as either a FONSI/FEIR or EIS/FEIR. The objective is to produce one document for both the federal and state review processes.

Alternatives

The air quality analysis will entail both mesoscale and microscale studies for the following seven alternatives:

1) 1988 Existing Case
2) 1993 Alt. I (No-Build west of Route 187)
3) 1993 Alt. II (Build southern alignment)
4) 1993 Alt. III (Build northern alignment)
5) 2013 Alt. I
6) 2013 Alt. II
7) 2013 Alt. III

The Expected Time of completion is in 1993. The later year is the Estimated Time of Completion plus 20 years.

Mesoscale Analysis

For the mesoscale analysis an area has been selected that encompasses all major roadway links whose traffic would be affected by the project--Old Route 57 from Route 187 to the western project limit; New Route 57 from Route 187 to the western project limit; Route 187 between the Old and New Routes 57; South West Street between the Old and New Routes 57. A map outlining this area was left with everyone attending the meeting.

The analysis will use the MOBILE-3 emissions model (or the most recent version available at the time the analysis begins) to estimate daily CO , NOx, and NMHC total emissions in the mesoscale study area. These emission totals will be calculated for all Alternatives and the results compared between Alternatives.

To comply with Appendix J of the SIP, if NMHC emissions for the Build Alternative are higher than No-Build emissions in either future year, then all reasonable and feasible hydrocarbon reduction measures will be identified and analyzed.

MOBILE-3 emission rates will be based on the following inputs:

- Daily average free-flow vehicle speeds.
- Default nationwide motor vehicle mix and cold/hot start percentages.
- An air temperature of $75^{o}F$.
- The Massachusetts age distributions for light-duty vehicles, light-duty trucks and heavy-duty trucks.
- I & M credits assuming 11% stringency, no cutpoints at 1.2% CO and 220 ppm HC for 1981 and later model years, the default value of Technology IV for pre-1981 model years.

Microscale Analysis

The microscale analysis will determine maximum 1-hour and 8-hour CO concentrations at sensitive receptors shown on the attached figures for the following six intersections:

(1) New Route 57/Route 187 (Alternative I and Alternative II, III options)
(2) Old Route 57/Route 187
(3) New Route 57/South West Street (Alternative II and III options)
(4) Old Route 57/South West Street
(5) Old and New Routes 57
(6) Shoemaker Lane/Route 187

Upon receipt of the LOS data for these intersections from Storch Engineers, Tech Environmental may drop an intersection from the air quality analysis if the LOS is good (A or B). All meeting attendees will be notified in writing if this does occur.

Receptors have been placed based on land use considerations, where the public has access and are expected to be for periods of time. All receptors are at a height of 1.8 m and a minimum of 3 m from the nearest travel lane. Based on the advice of the DEQE's Mike Scherer, several receptors have been added to the figures handed out at the meeting. In addition, the New Route 57/Route 187 intersection (Alternative I) has been added to the list of figures.

The microscale analysis will use the EPA Region I CALQ program, which includes the CALINE3 model. For signalized, over capacity situations, the NCHRP Signalized Intersection Capacity Method, will be used to calculate capacity, and the NCHRP Report 133 will be employed to estimate the queue length. For unsignalized intersections, the Highway Capacity Manual 1985 will be employed, the queuing equations (6) and (7) in Volume 9 (page 21) will be used to estimate queue length, assuming a 6-meter vehicle spacing. If an unsignalized intersection is over capacity, NCHRP Report 133 will also be employed in the calculation of queue length. In all special cases, the EPA Region I Mobile Source Modeling Procedures will be utilized to setup an equivalent line source for input to CALQ.

Other inputs to CALQ are--a 1000 m mixing height, a 108 cm roughness length (low-density residential), wind direction increments of 10^{o}, Class D stability, a 1.0 m/s wind speed, and traffic volume and speed data corresponding to peak time periods.

MOBILE-3 microscale emission rates will be based on the following inputs in addition to those previously listed:

- An air temperature of 30^{o}F.
- A cold/hot start mix of 50%/10% for the peak 1-hour.
- An idle emissions factor derived from the 5 mph emission rate and converted to grams/minute.

CO background levels of 3 ppm (1-hour) and 2 ppm (8-hour) corresponding to DEQE suburban area defaults will be used. Total predicted CO levels plus background will be compared to the NAAQS. If any violations are predicted, mitigation measures will be developed and tested.

Thank you for your time in attending this meeting and we look forward to working with you on this project.

Sincerely,

TECH ENVIRONMENTAL, INC.

Robert D. O'Neal
Environmental Scientist

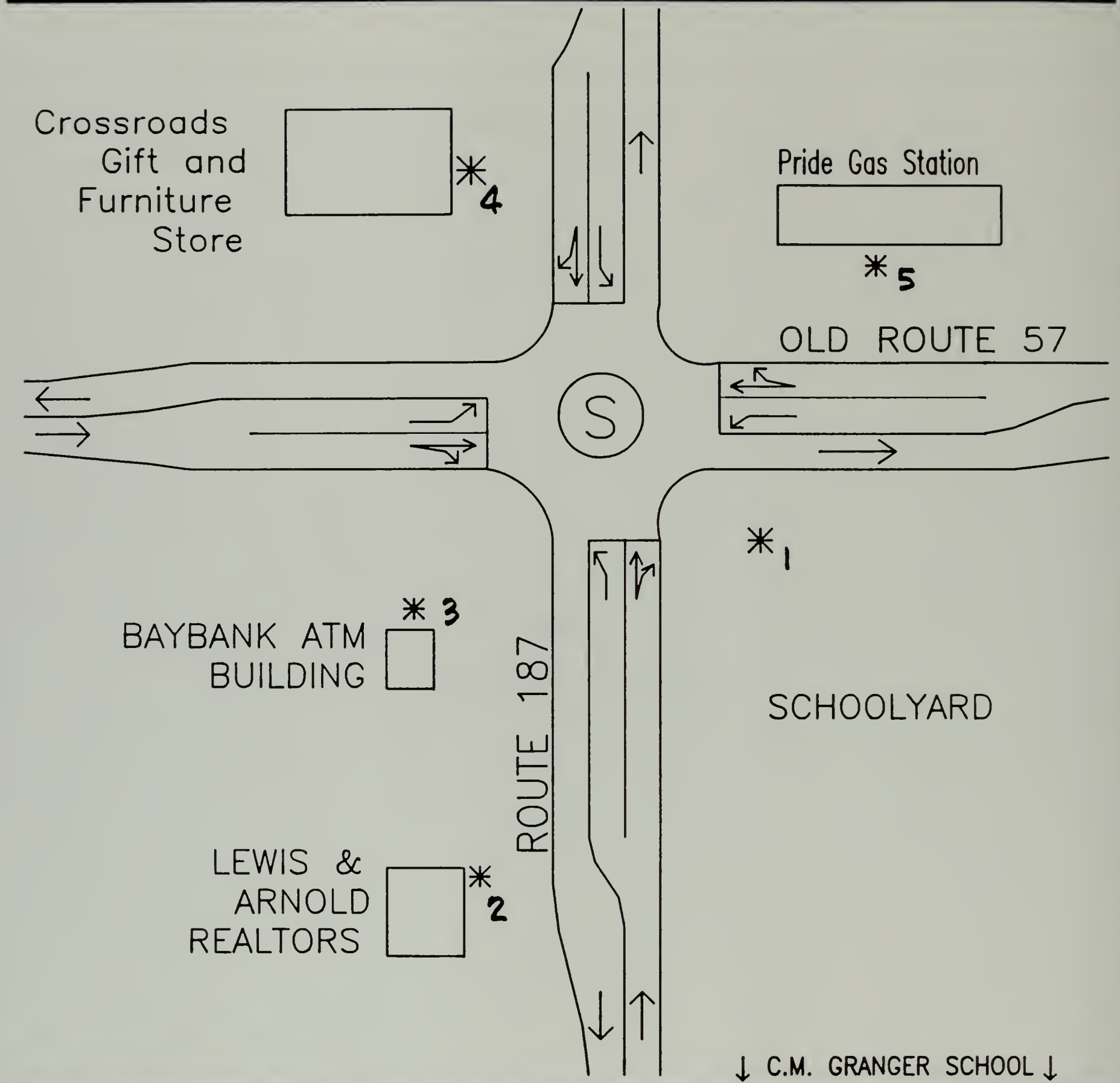
RDO/lg/L4

Enclosure

cc: Bea Reynolds, MDPW
Greg Heath, Storch Engineers
Thomas Wholley, U. S. EPA
Gary Idleburg, DEQE

SECTION F

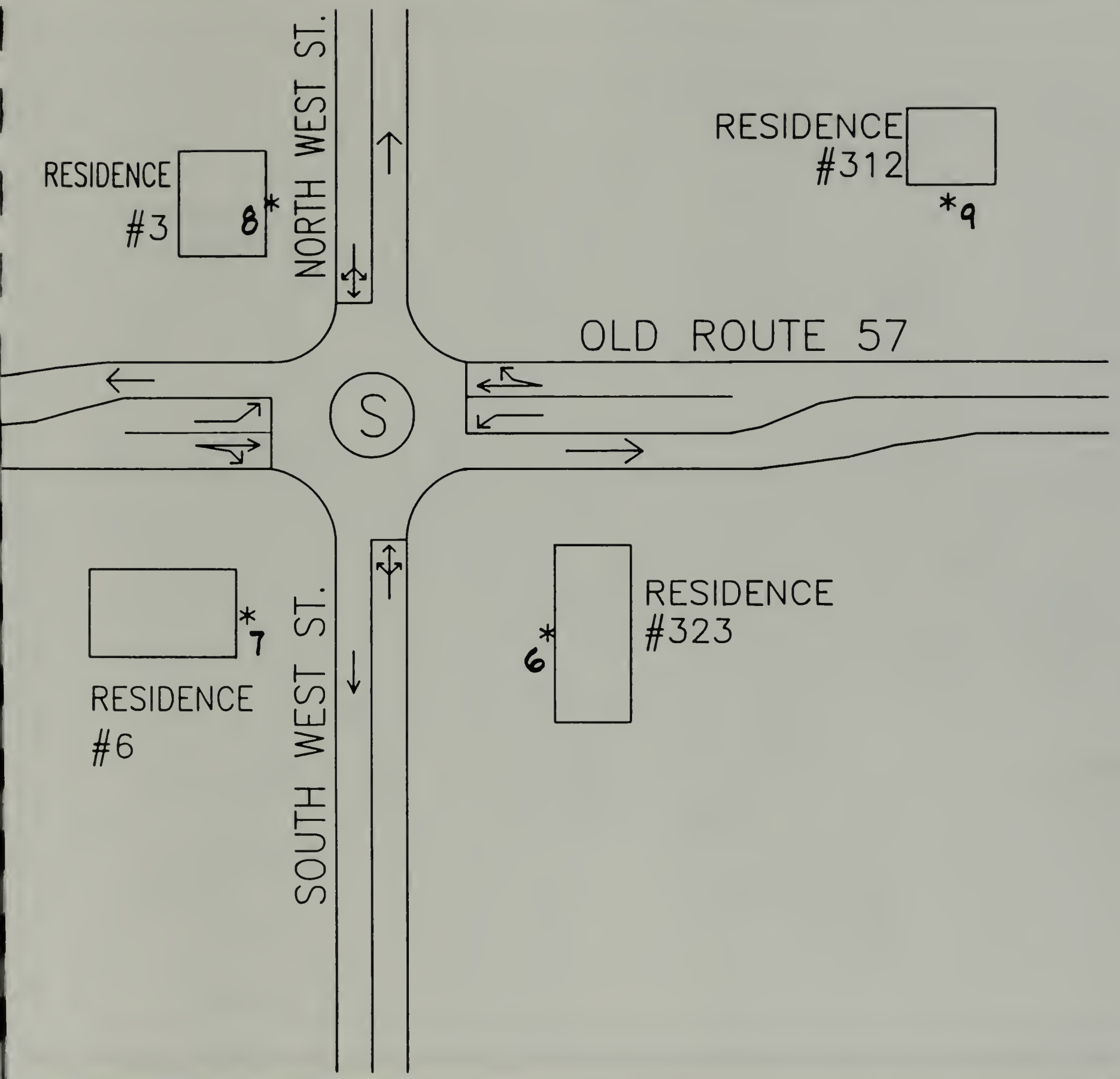
AIR QUALITY RECEPTORS



Air Quality Receptors (*)
Old Route 57 and
Route 187

Scale: 1" = 50'

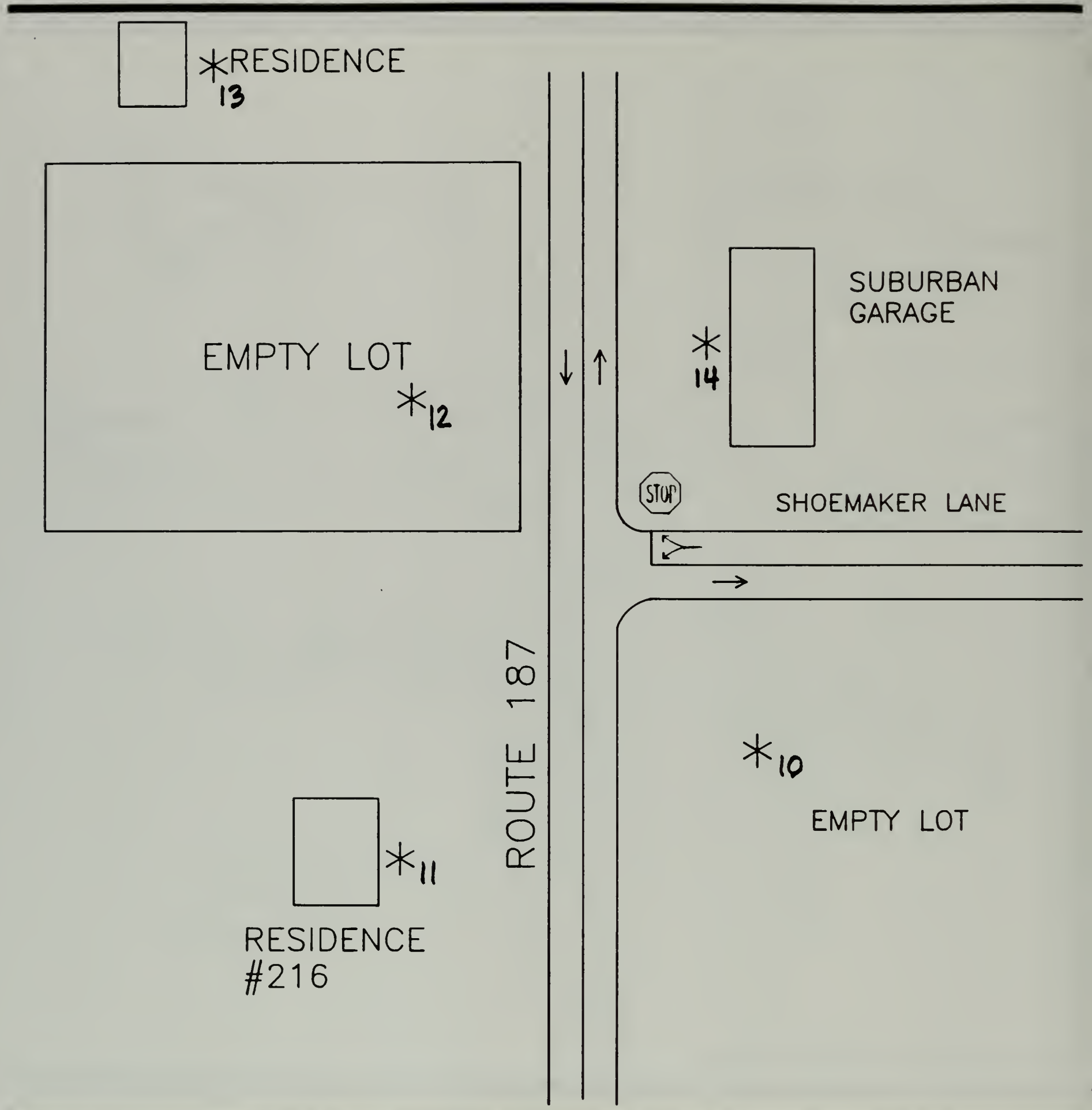
Figure



Air Quality Receptors (*)
Old Route 57,
North West St. &
South West St.

Scale: 1" = 50'

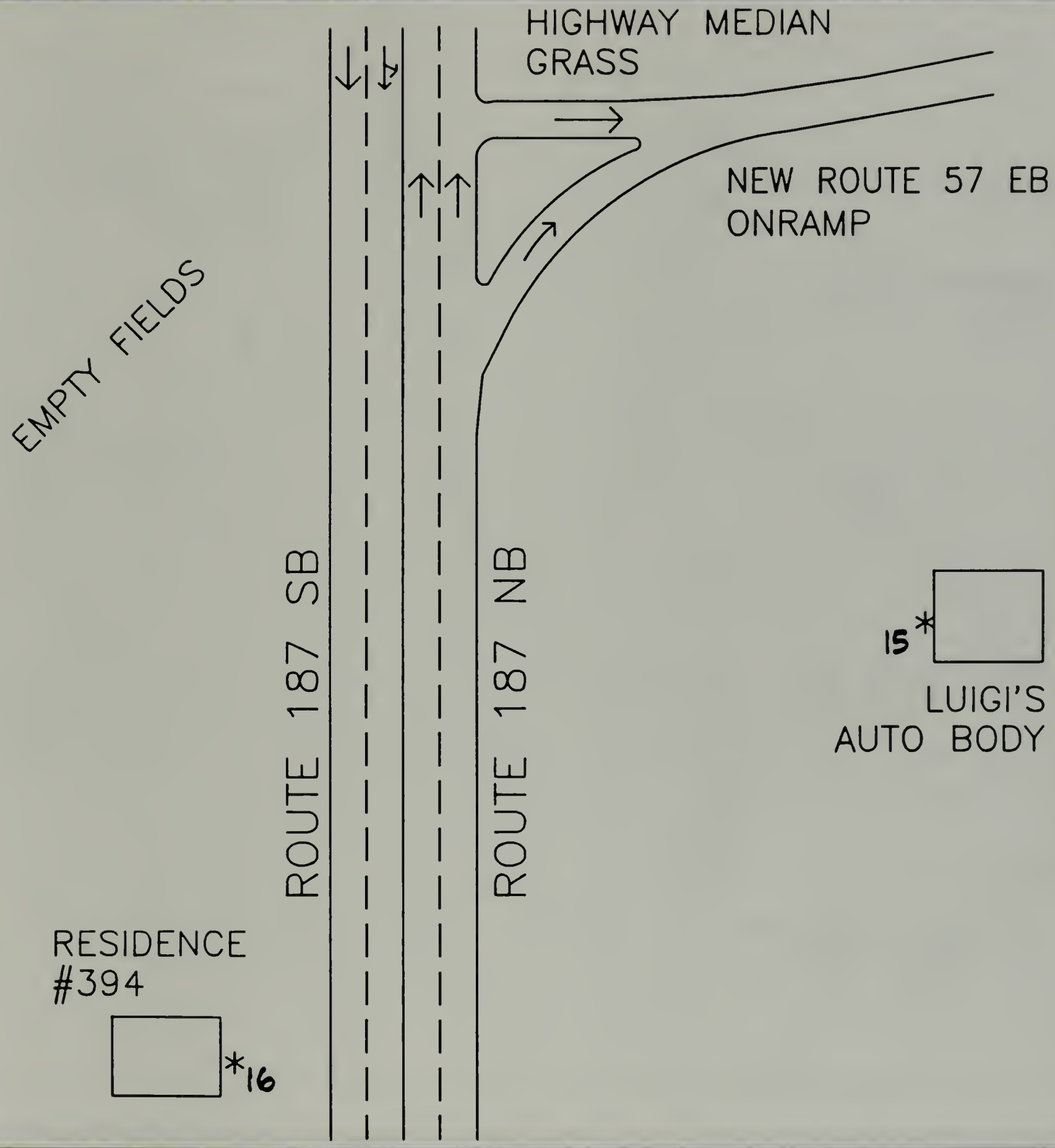
Figure



Air Quality Receptors (*)
Shoemaker Lane and
Route 187
(Signalized in 2013)

Scale: 1" = 50'

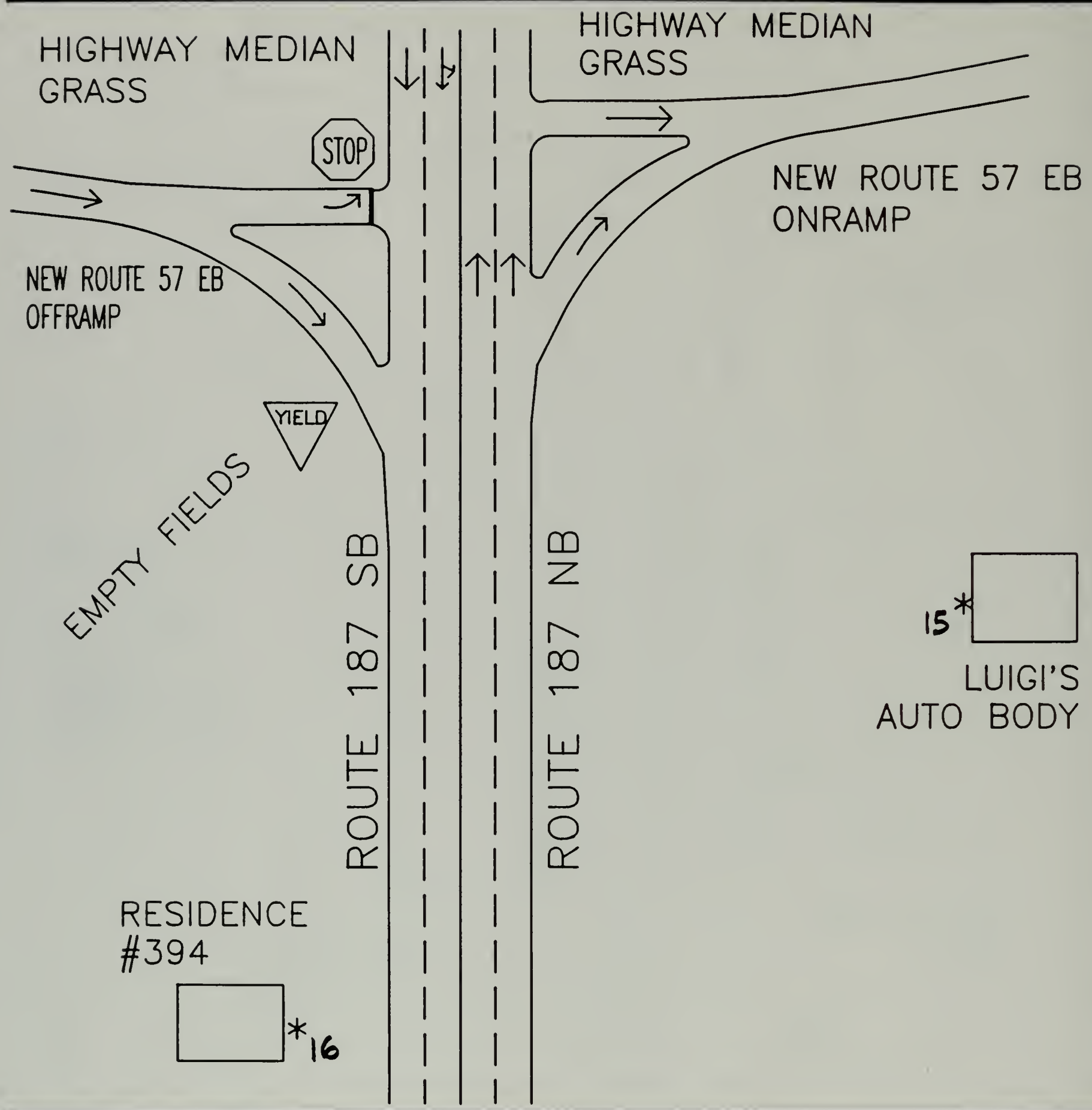
Figure



Air Quality Receptors (*)
New Route 57 EB Onramp
and Route 187
(1993, 2013– Alt. 1)

Scale: 1" = 50'

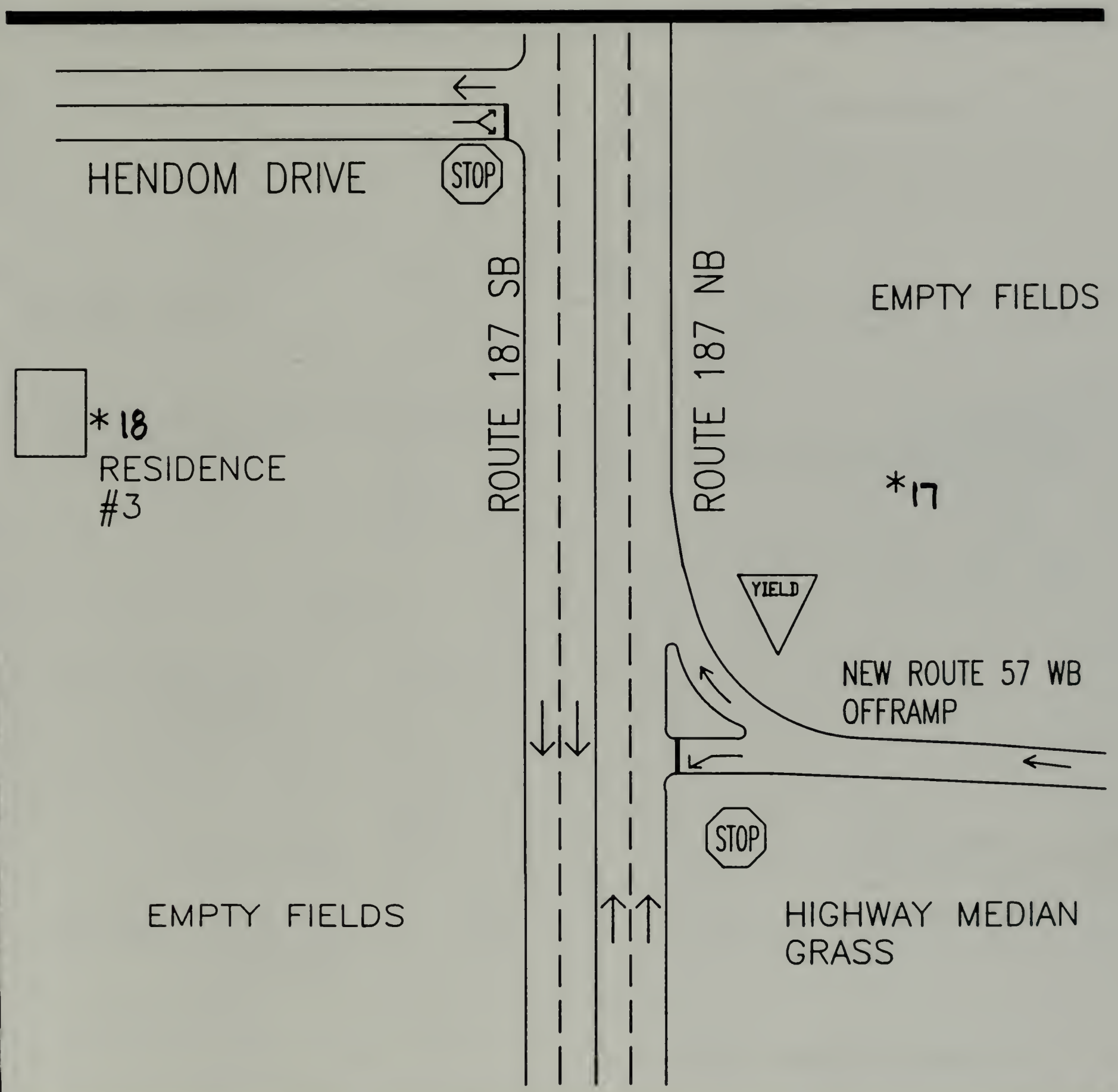
Figure



Air Quality Receptors (*)
New Route 57 EB Ramps
and Route 187
(1993, 2013– Alt. III, IV)

Scale: 1" = 50'

Figure



Air Quality Receptors (*)
New Route 57 WB Offramp
and Route 187
(1993, 2013– Alt. 1)

Scale: 1" = 50'

Figure

HENDOM DRIVE

STOP

ROUTE 187 SB

ROUTE 187 NB

EMPTY FIELDS

*18
RESIDENCE
#3

*17

YIELD

NEW ROUTE 57 WB
OFFRAMP

STOP

NEW ROUTE 57 WB ONRAMP

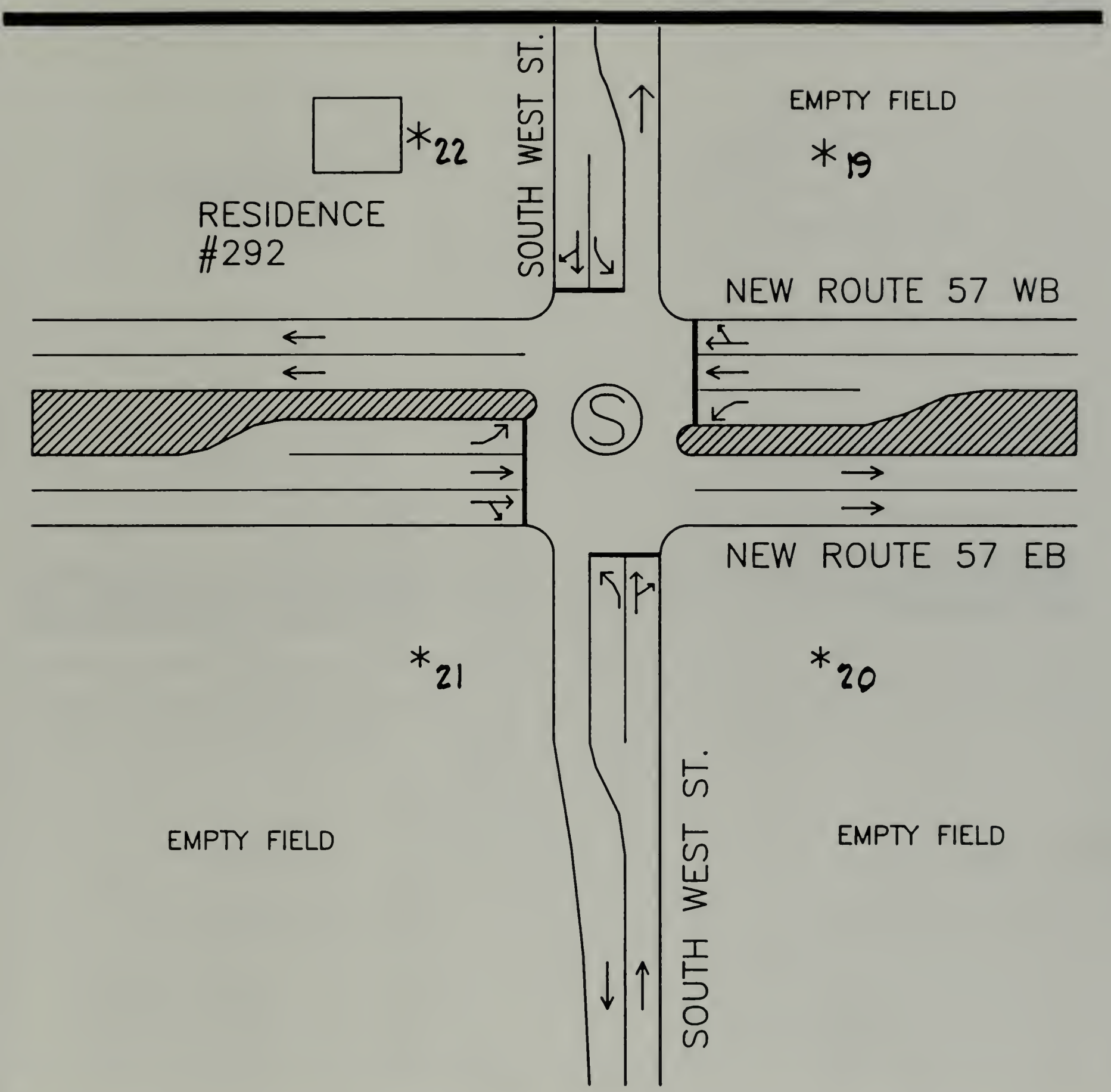
HIGHWAY MEDIAN
GRASS

HIGHWAY MEDIAN GRASS

Air Quality Receptors (*)
New Route 57 WB Ramps
and Route 187
(1993, 2013– Alt. III, IV)

Scale: 1" = 50'

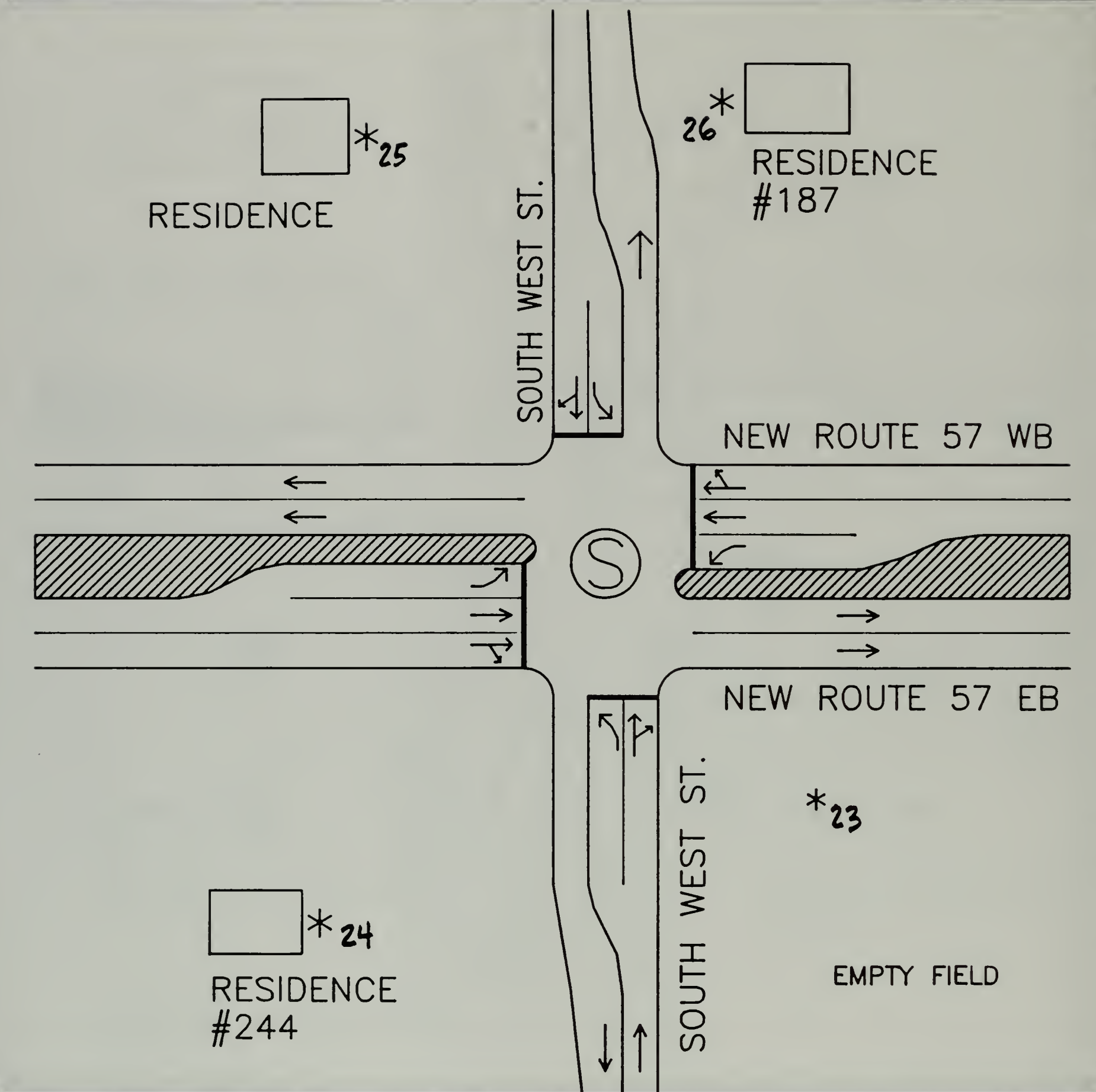
Figure



Air Quality Receptors (*)
New Route 57 and
South West Street
(1993, 2013– Alt.II)

Scale: 1" = 50'

Figure



Air Quality Receptors (*)
New Route 57 and
South West Street
(1993, 2013– Alt.III)

Scale: 1" = 50'

Figure

RECEPTOR NW

30 *

RECEPTOR NE

* 27

SOUTH WEST ST.

NEW ROUTE 57 WB

NEW ROUTE 57 EB

SOUTH WEST ST.

29 *

RECEPTOR SW

* 28

RECEPTOR SE

Air Quality Receptors (*)
New Route 57 and
South West Street
(1993, 2013– Alt. IV)

Scale: 1" = 50'

Figure

RESIDENCE
#316

32

RESIDENCE
#662

31

WOODS

OLD ROUTE 57

STOP

NEW ROUTE 57

33

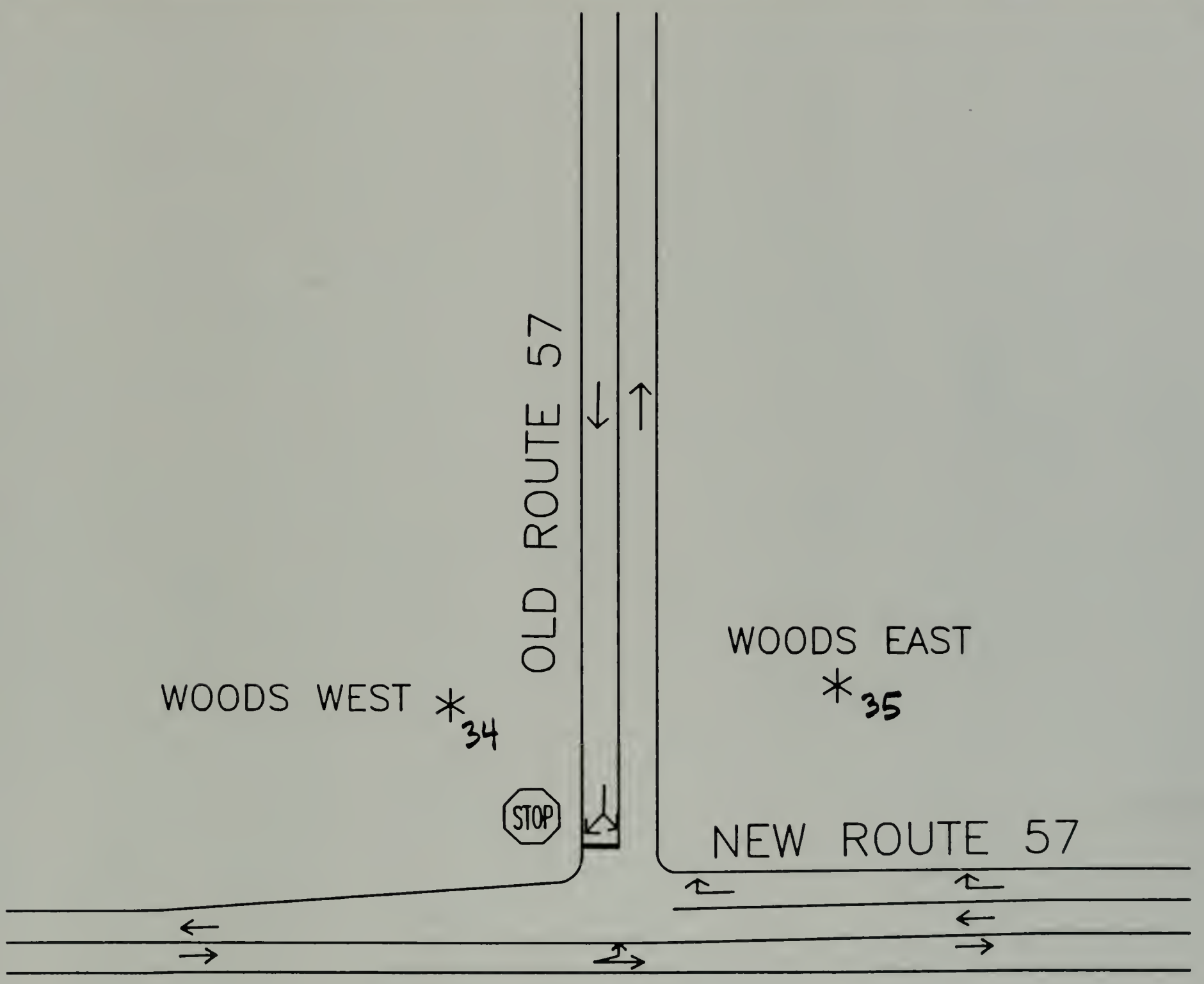
WOODS

WOODS

Air Quality Receptors (*)
Old Route 57 and
New Route 57
(1993, 2013– Alt.II)

Scale: 1" = 50'

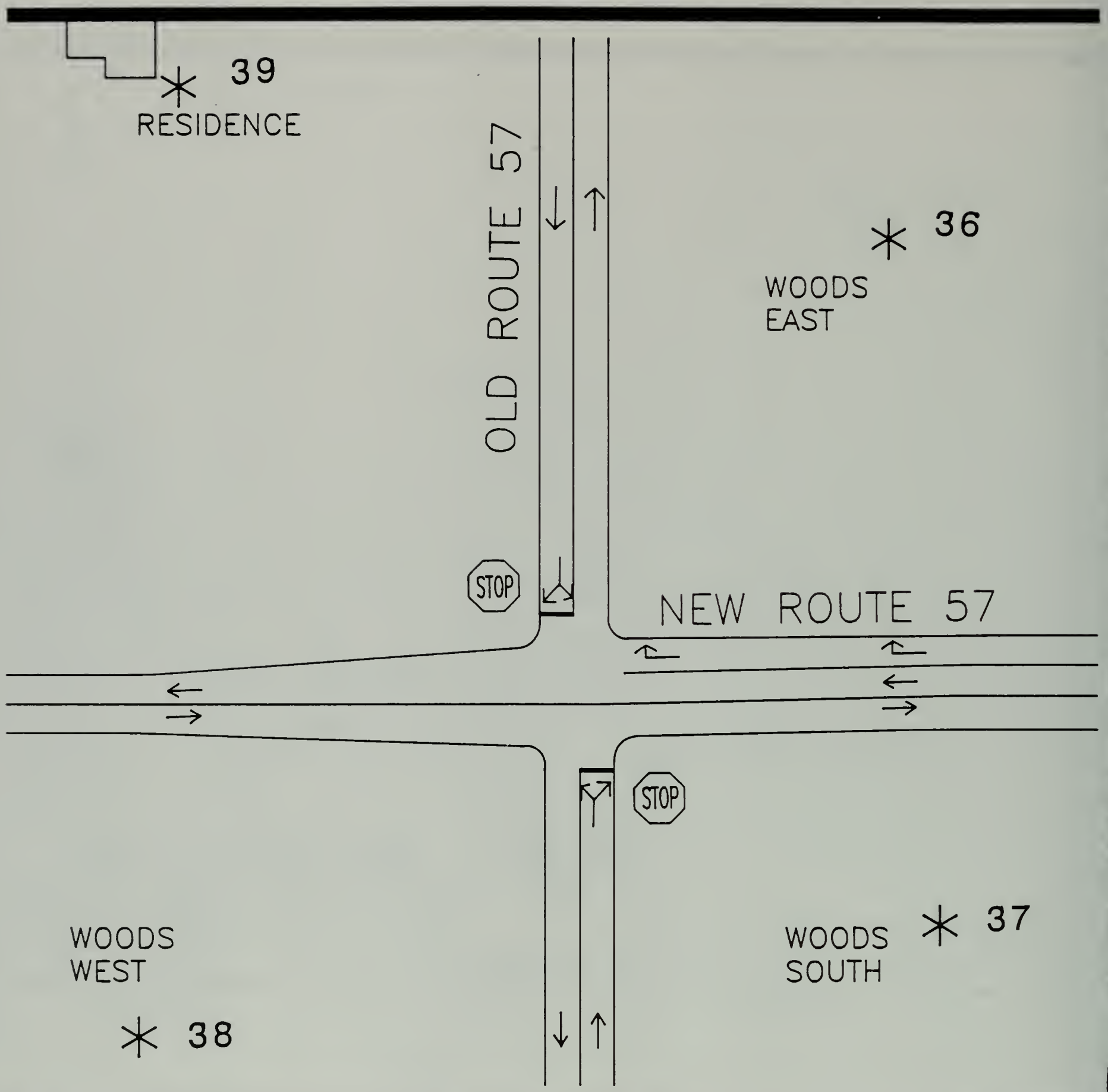
Figure



Air Quality Receptors (*)
Old Route 57 and
New Route 57
(1993, 2013– Alt.III)

Scale: 1" = 50'

Figure



Air Quality Receptors (*)
Old Route 57 and
New Route 57
(1993, 2013– Alt. IV)

Scale: 1" = 50'

Figure

APPENDIX 4.

NOISE

SECTION A

SUMMARY OF TRAFFIC NOISE

MODEL INPUT PARAMETERS

Tables 4.1 through 4.12 of this Appendix present input data used with the STAMINA 2/OPTIMA Model.

Total and automobile, medium and heavy truck volumes have been provided by Storch Engineers.

The traffic speed in kilometers per hour has been given to us by Storch Engineers and is presumed to be the same for all three classes of vehicles.

The hard and soft factors, 0 and 0.5, are used in the traffic noise model to account for reflectivity of the ground between the study location and roadway segments.

Attenuation is a factor accounting for sound propagation losses produced by foliage, buildings, and other obstructions. These have been estimated by field personnel and are consistent with FHWA RD-77-108 recommendations.

For each alternative, there are one or two segments for which input data is given. For example, in Table 4.1, New Route 57 and South Westfield Street produce traffic noise contributions at Location 1 under the Build Alternatives. At Location 2, on the other hand, only New Route 57 produces a meaningful contribution so that only this road segment is shown for the Build Alternatives.

Table 4.1

SUMMARY OF TRAFFIC NOISE MODEL INPUT PARAMETERS - LOCATION 1

	TOTAL VPH	AUTOS VPH	MEDIUM TRUCKS VPH	HEAVY TRUCKS VPH	SPEED IN KPH	HARD=0 SOFT=.5	ATTENUATION dB
EXISTING 1988 WESTFIELD ST.	1024	988	15	20	64	0.5	0
ALT. I 1993 WESTFIELD ST.	1116	1060	23	33	64	0.5	0
~~ALT. II 1993 NEW RT.57~~	~~1102~~	~~1047~~	~~22~~	~~33~~	~~80~~	~~0.5~~	~~0~~
~~ALT. II 1993 WESTFIELD ST.~~	~~682~~	~~658~~	~~10~~	~~14~~	~~64~~	~~0.5~~	~~0~~
ALT. IIIa 1993 NEW RT.57	762	724	15	23	80	0.5	0
ALT. IIIa 1993 WESTFIELD ST.	817	790	12	15	64	0.5	0
ALT. III 1993 NEW RT.57	1102	1047	22	33	80	0.5	0
ALT. III. 1993 WESTFIELD ST.	681	658	10	13	64	0.5	0
ALT. IVa 1993 NEW RT.57	762	724	15	23	80	0.5	0
ALT. IVa 1993 WESTFIELD ST.	817	790	12	15	64	0.5	0
ALT. IV 1993 NEW RT.57	1102	1047	22	33	80	0.5	0
ALT. IV · 1993 WESTFIELD ST.	681	658	10	13	64	0.5	0
ALT. I 2013 WESTFIELD ST.	1786	1697	36	53	64	0.5	0
~~ALT. II 2013 NEW RT.57~~	~~1688~~	~~1604~~	~~34~~	~~50~~	~~80~~	~~0.5~~	~~0~~
~~ALT. II 2013 WESTFIELD ST.~~	~~1036~~	~~1000~~	~~16~~	~~20~~	~~64~~	~~0.5~~	~~0~~
ALT. IIIa 2013 NEW RT.57	1287	1222	26	39	80	0.5	0
ALT. IIIa 2013 WESTFIELD ST.	1176	2234	18	24	64	0.5	0
ALT. II! 2013 NEW RT.57	1688	1604	34	50	80	0.5	0
ALT. III 2013 WESTFIELD ST.	1036	1000	16	20	64	0.5	0
ALT. IVa 2013 NEW RT.57	1287	1222	26	39	80	0.5	0

Table 4-1 (Continued)

SUMMARY OF TRAFFIC NOISE MODEL INPUT PARAMETERS - LOCATION 1

	TOTAL VPH	AUTOS VPH	MEDIUM TRUCKS VPH	HEAVY TRUCKS VPH	SPEED IN KPH	HARD=0 SOFT=.5	ATTENUATION dB
ALT. IVa 2013 WESTFIELD ST.	1176	2234	18	24	64	0.5	0
ALT. IV 2013 NEW RT.57	1688	1604	34	50	80	0.5	0
ALT. IV 2013 WESTFIELD ST.	1036	1000	16	20	64	0.5	0

Table 4-2

SUMMARY OF TRAFFIC NOISE MODEL INPUT PARAMETERS - LOCATION 2

	TOTAL VPH	AUTOS VPH	MEDIUM TRUCKS VPH	HEAVY TRUCKS VPH	SPEED IN KPH	HARD=0 SOFT=.5	ATTENUATION dB
EXISTING 1988 WESTFIELD ST.	1024	988	15	20	64	0.5	-10
ALT. I 1993 WESTFIELD ST.	1116	1060	23	33	64	0.5	-10
~~ALT. II 1993 NEW RT. 57~~	~~1102~~	~~1047~~	~~22~~	~~33~~	~~80~~	~~0.5~~	~~0~~
ALT. IIIa 1993 NEW RT. 57	762	724	15	23	80	0.5	0
ALT. III 1993 NEW RT. 57	1102	1047	22	33	80	0.5	0
ALT. IVa 1993 NEW RT. 57	762	724	15	23	80	0.5	0
ALT. IV 1993 NEW RT. 57	1102	1047	22	33	80	0.5	0
ALT. I 2013 WESTFIELD ST.	1786	1697	36	53	64	0.5	-10
~~ALT. II 2013 NEW RT. 57~~	~~1688~~	~~1604~~	~~34~~	~~50~~	~~80~~	~~0.5~~	~~0~~
ALT. IIIa 2013 NEW RT. 57	1287	1222	26	39	80	0.5	0
ALT. III 2013 NEW RT. 57	1688	1604	34	50	80	0.5	0
ALT. IVa 2013 NEW RT. 57	1287	1222	26	39	80	0.5	0
ALT. IV 2013 NEW RT. 57	1688	1604	34	50	80	0.5	0

Table 4-3
SUMMARY OF TRAFFIC NOISE MODEL INPUT PARAMETERS - LOCATION 3

	TOTAL VPH	AUTOS VPH	MEDIUM TRUCKS VPH	HEAVY TRUCKS VPH	SPEED IN KPH	HARD=0 SOFT=.5	ATTENUATION dB
EXISTING 1988 WEST ST. SOUTH	120	117	5	3	64	0.5	0
ALT. I 1993 WEST ST. SOUTH	120	117	5	3	64	0.5	0
~~ALT. II 1993~~ NEW RT. 57	~~1102~~	~~1047~~	~~22~~	~~33~~	~~80~~	~~0.5~~	~~0~~
~~ALT. II 1993~~ WEST ST. SOUTH	~~322~~	~~312~~	~~5~~	~~3~~	~~64~~	~~0.5~~	~~0~~
ALT. III 1993 NEW RT. 57 (From Westfield St. to South West St.)	1102	1047	22	33	80	0.5	0
ALT. III 1993 NEW RT. 57 (From South West St. to Old Rt. 57)	832	790	17	25	80	0.5	0
ALT. III 1993 WEST ST. SOUTH	279	272	4	3	64	0.5	0
ALT. IVa 1993 NEW RT. 57	762	724	15	23	80	0.5	0
ALT. IVa 1993 WEST ST. SOUTH	197	192	3	2	64	0.5	0
ALT. IV 1993 NEW RT. 57 (From Westfield St. to South West St.)	1102	1047	22	33	80	0.5	0
ALT. IV 1993 NEW RT. 57 (From South West St. to Old Rt. 57)	832	790	17	25	80	0.5	0
ALT. IV 1993 WEST ST. SOUTH	279	272	4	3	64	0.5	0
ALT. I 2013 WEST ST. SOUTH	194	189	3	2	64	0.5	0
~~ALT. II 2013~~ NEW RT. 57	~~1688~~	~~1604~~	~~34~~	~~50~~	~~80~~	~~0.5~~	~~0~~
~~ALT. II 2013~~ WEST ST. SOUTH	~~477~~	~~465~~	~~7~~	~~5~~	~~64~~	~~0.5~~	~~0~~
ALT. III 2013 NEW RT. 57 (From Westfield St. to South West St.)	1688	1604	34	50	80	0.5	0
ALT. III 2013 NEW RT. 57 (From South West St. to Old Rt. 57)	1344	1277	27	40	80	0.5	0
ALT. III 2013 WEST ST. SOUTH	414	404	6	4	64	0.5	0
ALT. IVa 2013 NEW RT. 57	1287	1222	26	39	80	0.5	0
ALT. IVa 2013 WEST ST. SOUTH	305	297	5	3	64	0.5	0
ALT. IV 2013 NEW RT. 57 (From Westfield St. to South West St.)	1688	1604	34	50	80	0.5	0

Table 4-3 (Continued)

SUMMARY OF TRAFFIC NOISE MODEL INPUT PARAMETERS - LOCATION 3

	TOTAL VPH	AUTOS VPH	MEDIUM TRUCKS VPH	HEAVY TRUCKS VPH	SPEED IN KPH	HARD=0 SOFT=.5	ATTENUATION dB
ALT. IV 2013 NEW RT. 57 (From South West St. to Old Rt. 57)	1344	1277	27	40	80	0.5	0
ALT. IV 2013 WEST ST. SOUTH	414	404	6	4	64	0.5	0

Table 4-4

SUMMARY OF TRAFFIC NOISE MODEL INPUT PARAMETERS - LOCATION 4

	TOTAL VPH	AUTOS VPH	MEDIUM TRUCKS VPH	HEAVY TRUCKS VPH	SPEED IN KPH	HARD=0 SOFT=.5	ATTENUATION dB
EXISTING 1988 SOUTHWICK ST.	1056	1003	21	32	56	0.5	-7
ALT. I 1993 SOUTHWICK ST.	979	930	20	29	56	0.5	-7
~~ALT. II 1993 NEW RT. 57~~	~~832~~	~~790~~	~~17~~	~~25~~	~~80~~	~~0.5~~	~~0~~
~~ALT. II 1993 SOUTHWICK ST.~~	~~244~~	~~235~~	~~4~~	~~5~~	~~56~~	~~0.5~~	~~7~~
ALT. IIIa 1993 NEW RT. 57 (From South West St. to Old Rt 57 Agawam)	762	724	15	23	80	0.5	0
ALT. IIIa 1993 NEW RT. 57 (From Old Rt. 57 Agawam to Old Rt. 57 Southwick)	1144	1087	23	34	80	0.5	0
ALT. IIIa 1993 SOUTHWICK ST.	266	257	4	5	56	0.5	-7
ALT. III 1993 NEW RT. 57 (From South West St. to Old Rt 57 Agawam)	832	790	17	25	80	0.5	0
ALT. III 1993 NEW RT. 57 (From Old Rt. 57 Agawam to Old Rt. 57 Southwick)	801	761	16	24	80	0.5	0
ALT. III 1993 SOUTHWICK ST.	255	246	4	5	56	0.5	-7
ALT. IVa 1993 NEW RT. 57 (From South West St. to Old Rt 57 Agawam)	762	724	15	23	80	0.5	0
ALT. IVa 1993 NEW RT. 57 (From Old Rt. 57 Agawam to Old Rt. 57 Southwick)	1144	1087	23	34	80	0.5	0
ALT. IVa 1993 SOUTHWICK ST.	266	257	4	5	56	0.5	-7
ALT. IV 1993 NEW RT. 57 (From South West St. to Old Rt 57 Agawam)	832	790	17	25	80	0.5	0
ALT. IV 1993 NEW RT. 57 (From Old Rt. 57 Agawam to Old Rt. 57 Southwick)	801	761	16	24	80	0.5	0
ALT. IV 1993 SOUTHWICK ST.	255	246	4	5	56	0.5	-7
ALT. I 2013 SOUTHWICK ST.	1455	1382	29	44	56	0.5	-7
~~ALT. II 2013 NEW RT. 57~~	~~1344~~	~~1277~~	~~27~~	~~40~~	~~80~~	~~0.5~~	~~0~~
~~ALT. II 2013 SOUTHWICK ST.~~	~~318~~	~~302~~	~~6~~	~~6~~	~~56~~	~~0.5~~	~~7~~
ALT. IIIa 2013 NEW RT. 57 (From South West St. to Old Rt 57 Agawam)	1287	1223	26	39	80	0.5	0
ALT. IIIa 2013 NEW RT. 57 (From Old Rt. 57 Agawam to Old Rt. 57 Southwick)	2016	1915	40	60	80	0.5	0

Table 4-4 (Continued)

SUMMARY OF TRAFFIC NOISE MODEL INPUT PARAMETERS - LOCATION 4

	TOTAL VPH	AUTOS VPH	MEDIUM TRUCKS VPH	HEAVY TRUCKS VPH	SPEED IN KPH	HARD=0 SOFT=.5	ATTENUATION dB
ALT. IIIa 2013 SOUTHWICK ST.	362	349	5	8	56	0.5	-7
ALT. III 2013 NEW RT. 57 (From South West St. to Old Rt 57 Agawam)	1344	1277	27	40	80	0.5	0
ALT. III 2013 NEW RT. 57 (From Old Rt. 57 Agawam to Old Rt. 57 Southwick)	1294	1229	26	39	80	0.5	0
ALT. III - 2013 SOUTHWICK ST.	333	321	5	7	56	0.5	-7
ALT. IVa 2013 NEW RT. 57 (From South West St. to Old Rt 57 Agawam)	1287	1223	26	39	80	0.5	0
ALT. IVa 2013 NEW RT. 57 (From Old Rt. 57 Agawam to Old Rt. 57 Southwick)	2016	1915	40	60	80	0.5	0
ALT. IVa 2013 SOUTHWICK ST.	362	349	5	8	56	0.5	-7
ALT. IV 2013 NEW RT. 57 (From South West St. to Old Rt 57 Agawam)	1344	1277	27	40	80	0.5	0
ALT. IV 2013 NEW RT. 57 (From Old Rt. 57 Agawam to Old Rt. 57 Southwick)	1294	1229	26	39	80	0.5	0
ALT. IV 2013 SOUTHWICK ST.	333	321	5	7	56	0.5	-7

Table 4-5

SUMMARY OF TRAFFIC NOISE MODEL INPUT PARAMETERS - LOCATION 5

	TOTAL VPH	AUTOS VPH	MEDIUM TRUCKS VPH	HEAVY TRUCKS VPH	SPEED IN KPH	HARD=0 SOFT=.5	ATTENUATION dB
EXISTING 1988 SOUTHWICK ST.	1056	1003	21	32	56	0.5	0
ALT. I 1993 SOUTHWICK ST.	979	930	20	29	56	0.5	0
~~ALT. II 1993 SOUTHWICK ST.~~	~~255~~	~~246~~	~~4~~	~~5~~	~~56~~	~~0.5~~	~~0~~
~~ALT. II 1993 NEW RT. 57~~	~~1102~~	~~1047~~	~~22~~	~~33~~	~~80~~	~~0.5~~	~~-10~~
ALT. IIIa 1993 NEW RT. 57	762	724	15	23	80	0.5	-10
ALT. IIIa 1993 SOUTHWICK ST.	266	257	4	5	56	0.5	0
ALT. III 1993 NEW RT. 57 (From Westfield St. to South West St.)	1102	1047	22	33	80	0.5	-10
ALT. III 1993 NEW RT. 57 (From South West St. to Old Rt. 57)	832	790	17	25	80	0.5	-10
ALT. III 1993 SOUTHWICK ST.	255	246	4	5	56	0.5	0
ALT. IVa 1993 NEW RT. 57	762	724	15	23	80	0.5	-10
ALT. IVa 1993 SOUTHWICK ST.	266	257	4	5	56	0.5	0
ALT. IV 1993 NEW RT. 57 (From Westfield St. to South West St.)	1102	1047	22	33	80	0.5	-10
ALT. IV 1993 NEW RT. 57 (From South West St. to Old Rt. 57)	832	790	17	25	80	0.5	-10
ALT. IV 1993 SOUTHWICK ST.	255	246	4	5	56	0.5	0
ALT. I 2013 SOUTHWICK ST.	1455	1382	29	44	56	0.5	0
~~ALT. II 2013 SOUTHWICK ST.~~	~~333~~	~~321~~	~~5~~	~~7~~	~~56~~	~~0.5~~	~~0~~
~~ALT. II 2013 NEW RT. 57~~	~~1688~~	~~1604~~	~~34~~	~~50~~	~~80~~	~~0.5~~	~~-10~~
ALT. IIIa 2013 NEW RT. 57	1287	1222	26	39	80	0.5	-10
ALT. IIIa 2013 SOUTHWICK ST.	362	349	5	8	56	0.5	0
ALT. III 2013 NEW RT. 57 (From Westfield St. to South West St.)	1688	1604	34	50	80	0.5	-10
ALT. III 2013 NEW RT. 57 (From South West St. to Old Rt. 57)	1344	1277	27	40	80	0.5	-10

Table 4-5 (Continued)

SUMMARY OF TRAFFIC NOISE MODEL INPUT PARAMETERS - LOCATION 5

	TOTAL VPH	AUTOS VPH	MEDIUM TRUCKS VPH	HEAVY TRUCKS VPH	SPEED IN KPH	HARD=0 SOFT=.5	ATTENUATION dB
ALT. III 2013 SOUTHWICK ST.	333	321	5	7	56	0.5	0
ALT. IVa 2013 NEW RT. 57	1287	1222	26	39	80	0.5	-10
ALT. IVa 2013 SOUTHWICK ST.	362	349	5	8	56	0.5	0
ALT. IV 2013 NEW RT. 57 (From Westfield St. to South West St.)	1688	1604	34	50	80	0.5	-10
ALT. IV 2013 NEW RT. 57 (From South West St. to Old Rt. 57)	1344	1277	27	40	80	0.5	0
ALT. III 2013 SOUTHWICK ST.	333	321	5	7	56	0.5	-10

Table 4-6

SUMMARY OF TRAFFIC NOISE MODEL INPUT PARAMETERS - LOCATION 6

	TOTAL VPH	AUTOS VPH	MEDIUM TRUCKS VPH	HEAVY TRUCKS VPH	SPEED IN KPH	HARD=0 SOFT=.5	ATTENUATION dB
EXISTING 1988 SOUTHWICK ST.	1307	1261	20	26	64	0.5	0
ALT. I 1993 SOUTHWICK ST.	1334	1287	20	27	64	0.5	0
ALT. II 1993 SOUTHWICK ST.	444	428	7	9	64	0.5	0
ALT. IIIa 1993 SOUTHWICK ST.	489	472	7	10	64	0.5	0
ALT. III 1993 SOUTHWICK ST.	444	428	7	9	64	0.5	0
ALT. IVa 1993 SOUTHWICK ST.	489	472	7	10	64	0.5	0
ALT. IV 1993 SOUTHWICK ST.	444	428	7	9	64	0.5	0
ALT. I 2013 SOUTHWICK ST.	1896	1801	38	57	64	0.5	0
ALT. II 2013 SOUTHWICK ST.	589	568	9	12	64	0.5	0
ALT. IIIa 2013 SOUTHWICK ST.	651	628	10	13	64	0.5	0
ALT. III 2013 SOUTHWICK ST.	589	568	9	12	64	0.5	0
ALT. IVa 2013 SOUTHWICK ST.	651	628	10	13	64	0.5	0
ALT. IV 2013 SOUTHWICK ST.	589	568	9	12	64	0.5	0

Table 4-7

SUMMARY OF TRAFFIC NOISE MODEL INPUT PARAMETERS - LOCATION 7

	TOTAL VPH	AUTOS VPH	MEDIUM TRUCKS VPH	HEAVY TRUCKS VPH	SPEED IN KPH	HARD=0 SOFT=.5	ATTENUATION dB
EXISTING 1988 WESTFIELD ST.	746	720	11	15	64	0.5	0
ALT. I 1993 WESTFIELD ST.	1222	1161	24	37	64	0.5	0
ALT. II 1993 WESTFIELD ST.	516	498	8	10	64	0.5	0
ALT. IIIa 1993 WESTFIELD ST.	621	600	9	12	64	0.5	0
ALT. III 1993 WESTFIELD ST.	516	498	8	10	64	0.5	0
ALT. IVa 1993 WESTFIELD ST.	621	600	9	12	64	0.5	0
ALT. IV 1993 WESTFIELD ST.	516	498	8	10	64	0.5	0
ALT. I 2013 WESTFIELD ST.	1800	1710	36	54	64	0.5	0
ALT. II 2013 WESTFIELD ST.	706	683	11	14	64	0.5	0
ALT. IIIa 2013 WESTFIELD ST.	792	765	11	16	64	0.5	0
ALT. III 2013 WESTFIELD ST.	708	683	11	14	64	0.5	0
ALT. IVa 2013 WESTFIELD ST.	792	765	11	16	64	0.5	0
ALT. IV 2013 WESTFIELD ST.	708	683	11	14	64	0.5	0

Table 4-8

SUMMARY OF TRAFFIC NOISE MODEL INPUT PARAMETERS - LOCATION 8

	TOTAL VPH	AUTOS VPH	MEDIUM TRUCKS VPH	HEAVY TRUCKS VPH	SPEED IN KPH	HARD=0 SOFT=.5	ATTENUATION dB
EXISTING 1988 SO. WEST ST	120	116	5	3	64	0.5	0
ALT. I 1993 SO. WEST ST	120	116	5	3	64	0.5	0
~~ALT. II 1993 NEW RT. 57~~	~~1102~~	~~1047~~	~~22~~	~~33~~	~~80~~	~~0.5~~	~~0~~
~~ALT. II 1993 SO. WEST ST~~	~~322~~	~~312~~	~~5~~	~~6~~	~~64~~	~~0.5~~	~~0~~
ALT. IVa 1993 NEW RT. 57	762	724	15	23	80	0.5	0
ALT. IVa 1993 SO. WEST ST	197	192	3	2	64	0.5	0
ALT. IV 1993 NEW RT. 57 (From Westfield St. to South West St.)	1102	1047	22	33	80	0.5	0
ALT. IV 1993 NEW RT. 57 (From South West St. to Old Rt. 57)	832	790	17	25	80	0.5	0
ALT. IV 1993 SO. WEST ST	279	272	4	3	64	0.5	0
ALT. I 2013 SO. WEST ST	194	187	3	4	64	0.5	0
~~ALT. II 2013 NEW RT. 57~~	~~1688~~	~~1604~~	~~34~~	~~50~~	~~64~~	~~0.5~~	~~3~~
~~ALT. II 2013 SO. WEST ST~~	~~477~~	~~461~~	~~7~~	~~9~~	~~64~~	~~0.5~~	~~0~~
ALT. IVa 2013 NEW RT. 57	1287	1222	26	39	80	0.5	0
ALT. IVa 2013 SO. WEST ST	305	297	5	3	64	0.5	0
ALT. IV 2013 NEW RT. 57 (From Westfield St. to South West St.)	1688	1604	34	50	80	0.5	0
ALT. IV 2013 NEW RT. 57 (From South West St. to Old Rt. 57)	1344	1277	27	40	80	0.5	0
ALT. IV 2013 SO. WEST ST	414	404	6	4	64	0.5	0

Table 4-9

SUMMARY OF TRAFFIC NOISE MODEL INPUT PARAMETERS - LOCATION 9

	TOTAL VPH	AUTOS VPH	MEDIUM TRUCKS VPH	HEAVY TRUCKS VPH	SPEED IN KPH	HARD=0 SOFT=.5	ATTENUATION dB
EXISTING 1988 WESTFIELD ST.	1024	988	15	20	64	0.5	-10
ALT. I 1993 WESTFIELD ST.	1116	1060	23	33	64	0.5	-10
ALT. II 1993 NEW RT. 57	1102	1047	22	33	80	0.5	0
ALT. IIIa 1993 NEW RT. 57	762	724	15	23	80	0.5	0
ALT. III 1993 NEW RT. 57	1102	1047	22	33	80	0.5	0
ALT. IVa 1993 NEW RT. 57	762	724	15	23	80	0.5	0
ALT. IV 1993 NEW RT. 57	1102	1047	22	33	80	0.5	0
ALT. I 2013 WESTFIELD ST.	1786	1697	36	53	64	0.5	-10
ALT. II 2013 NEW RT. 57	1688	1604	34	50	80	0.5	0
ALT. IIIa 2013 NEW RT. 57	1287	1222	26	39	80	0.5	0
ALT. III 2013 NEW RT. 57	1688	1604	34	50	80	0.5	0
ALT. IVa 2013 NEW RT. 57	1287	1222	26	39	80	0.5	0
ALT. IV 2013 NEW RT. 57	1688	1604	34	50	80	0.5	0

Table 4-10

SUMMARY OF TRAFFIC NOISE MODEL INPUT PARAMETERS - LOCATION 10

	TOTAL VPH	AUTOS VPH	MEDIUM TRUCKS VPH	HEAVY TRUCKS VPH	SPEED IN KPH	HARD=0 SOFT=.5	ATTENUATION dB
EXISTING 1988 SOUTHWICK ST.	1056	1003	21	32	56	0.5	-3
ALT. I 1993 SOUTHWICK ST.	979	930	20	29	56	0.5	-3
ALT. II 1993 NEW RT. 57	832	790	17	25	80	0.5	0
ALT. II 1993 SOUTHWICK ST.	244	235	4	5	56	0.5	-3
ALT. IVa 1993 NEW RT. 57	1144	1087	23	34	80	0.5	0
ALT. IVa 1993 SOUTHWICK ST.	266	257	4	5	56	0.5	-3
ALT. IV 1993 NEW RT. 57	701	666	14	21	80	0.5	0
ALT. IV 1993 SOUTHWICK ST.	255	246	4	5	56	0.5	-3
ALT. I 2013 SOUTHWICK ST.	1455	1382	29	44	56	0.5	-3
ALT. II 2013 NEW RT. 57	1344	1277	27	40	80	0.5	0
ALT. II 2013 SOUTHWICK ST.	318	308	5	6	56	0.5	-3
ALT. IVa 2013 NEW RT. 57	2016	1915	40	60	80	0.5	0
ALT. IVa 2013 SOUTHWICK ST.	362	349	5	8	56	0.5	-3
ALT. IV 2013 NEW RT. 57	1294	1229	26	39	80	0.5	0
ALT. IV 2013 SOUTHWICK ST.	333	321	5	7	56	0.5	-3

Table 4-11

SUMMARY OF TRAFFIC NOISE MODEL INPUT PARAMETERS - LOCATION 11

	TOTAL VPH	AUTOS VPH	MEDIUM TRUCKS VPH	HEAVY TRUCKS VPH	SPEED IN KPH	HARD=0 SOFT=.5	ATTENUATION dB
EXISTING 1988 WEST ST. SOUTH	120	117	5	3	64	0.5	0
ALT. I 1993 WEST ST. SOUTH	120	117	5	3	64	0.5	0
~~ALT. II 1993 NEW RT. 57~~	~~1102~~	~~1047~~	~~22~~	~~33~~	~~80~~	~~0.5~~	~~0~~
~~ALT. II 1993 WEST ST. SOUTH~~	~~322~~	~~312~~	~~5~~	~~3~~	~~64~~	~~0.5~~	~~0~~
ALT. IIIa 1993 NEW RT. 57	762	724	15	23	80	0.5	0
ALT. IIIa 1993 WEST ST. SOUTH	197	192	3	2	64	0.5	0
ALT. III 1993 NEW RT. 57 (From Westfield St. to South West St.)	1102	1047	22	33	80	0.5	0
ALT. III 1993 NEW RT. 57 (From South West St. to Old Rt. 57)	832	790	17	25	80	0.5	0
ALT. III 1993 WEST ST. SOUTH	279	272	4	3	64	0.5	0
ALT. IV 1993 NEW RT. 57 (From Westfield St. to South West St.)	1102	1047	22	33	80	0.5	0
ALT. IV 1993 NEW RT. 57 (From South West St. to Old Rt. 57)	832	790	17	25	80	0.5	0
ALT. III 1993 WEST ST. SOUTH	279	272	4	3	64	0.5	0
ALT. I 2013 WEST ST. SOUTH	194	189	3	2	64	0.5	0
~~ALT. II 2013 NEW RT. 57~~	~~1688~~	~~1604~~	~~34~~	~~50~~	~~64~~	~~0.5~~	~~0~~
~~ALT. II 2013 WEST ST. SOUTH~~	~~477~~	~~465~~	~~7~~	~~5~~	~~64~~	~~0.5~~	~~0~~
ALT. IIIa 2013 NEW RT. 57	1287	1222	26	39	80	0.5	0
ALT. IIIa 2013 WEST ST. SOUTH	305	297	5	3	64	0.5	0
ALT. III 2013 NEW RT. 57 (From Westfield St. to South West St.)	1688	1604	34	50	80	0.5	0
ALT. III 2013 NEW RT. 57 (From South West St. to Old Rt. 57)	1344	1277	27	40	80	0.5	0
ALT. III 2013 WEST ST. SOUTH	414	404	6	4	64	0.5	0
ALT. IV 2013 NEW RT. 57 (From Westfield St. to South West St.)	1688	1604	34	50	80	0.5	0

Table 4-11 (Continued)

SUMMARY OF TRAFFIC NOISE MODEL INPUT PARAMETERS - LOCATION 11

	TOTAL VPH	AUTOS VPH	MEDIUM TRUCKS VPH	HEAVY TRUCKS VPH	SPEED IN KPH	HARD=0 SOFT=.5	ATTENUATION dB
ALT. IV 2013 NEW RT. 57 (From South West St. to Old Rt. 57)	1344	1277	27	40	80	0.5	0
ALT. IV 2013 WEST ST. SOUTH	414	404	6	4	64	0.5	0

Table 4-12

SUMMARY OF TRAFFIC NOISE MODEL INPUT PARAMETERS - LOCATION 12

	TOTAL VPH	AUTOS VPH	MEDIUM TRUCKS VPH	HEAVY TRUCKS VPH	SPEED IN KPH	HARD=0 SOFT=.5	ATTENUATION dB
EXISTING 1988 WEST ST. SOUTH	120	117	5	3	64	0.5	0
ALT. I 1993 WEST ST. SOUTH	120	117	5	3	64	0.5	0
~~ALT. II 1993 NEW RT. 57~~	~~1102~~	~~1047~~	~~22~~	~~33~~	~~80~~	~~0.5~~	~~0~~
~~ALT. II 1993 WEST ST. SOUTH~~	~~322~~	~~312~~	~~5~~	~~3~~	~~64~~	~~0.5~~	~~0~~
ALT. IIIa 1993 NEW RT. 57	762	724	15	23	80	0.5	0
ALT. IIIa 1993 WEST ST. SOUTH	197	192	3	2	64	0.5	0
ALT. III 1993 NEW RT. 57 (From Westfield St. to South West St.)	1102	1047	22	33	80	0.5	0
ALT. III 1993 NEW RT. 57 (From South West St. to Old Rt. 57)	832	790	17	25	80	0.5	0
ALT. III 1993 WEST ST. SOUTH	279	272	4	3	64	0.5	0
ALT. IVa 1993 NEW RT. 57	762	724	15	23	80	0.5	0
ALT. IVa 1993 WEST ST. SOUTH	197	192	3	2	64	0.5	0
ALT. IV 1993 NEW RT. 57 (From Westfield St. to South West St.)	1102	1047	22	33	80	0.5	0
ALT. IV 1993 NEW RT. 57 (From South West St. to Old Rt. 57)	832	790	17	25	80	0.5	0
ALT. III 1993 WEST ST. SOUTH	279	272	4	3	64	0.5	0
ALT. I 2013 WEST ST. SOUTH	194	189	3	2	64	0.5	0
~~ALT. II 2013 NEW RT. 57~~	~~1688~~	~~1604~~	~~34~~	~~50~~	~~64~~	~~0.5~~	~~0~~
~~ALT. II 2013 WEST ST. SOUTH~~	~~477~~	~~465~~	~~7~~	~~5~~	~~64~~	~~0.5~~	~~0~~
ALT. IIIa 2013 NEW RT. 57	1287	1222	26	39	80	0.5	0
ALT. IIIa 2013 WEST ST. SOUTH	305	297	5	3	64	0.5	0
ALT. III 2013 NEW RT. 57 (From Westfield St. to South West St.)	1688	1604	34	50	80	0.5	0
ALT. III 2013 NEW RT. 57 (From South West St. to Old Rt. 57)	1344	1277	27	40	80	0.5	0

Table 4-12 (Continued)

SUMMARY OF TRAFFIC NOISE MODEL INPUT PARAMETERS - LOCATION 12

	TOTAL VPH	AUTOS VPH	MEDIUM TRUCKS VPH	HEAVY TRUCKS VPH	SPEED IN KPH	HARD=0 SOFT=.5	ATTENUATION dB
ALT. III 2013 WEST ST. SOUTH	414	404	6	4	64	0.5	0
ALT. IVa 2013 NEW RT. 57	1287	1222	26	39	80	0.5	0
ALT. IVa 2013 WEST ST. SOUTH	305	297	5	3	64	0.5	0
ALT. IV 2013 NEW RT. 57 (From Westfield St. to South West St.)	1688	1604	34	50	80	0.5	0
ALT. IV 2013 NEW RT. 57 (From South West St. to Old Rt. 57)	1344	1277	27	40	80	0.5	0
ALT. IV 2013 WEST ST. SOUTH	414	404	6	4	64	0.5	0

SECTION B

NOISE BARRIER ANALYSIS SUMMARY

Figure 4.1 contains an area plan indicating the single family residences impacted by noise from Route 57 Alternatives III and IV and Alternatives III(a) and IV(a). A traffic sound level analysis has been conducted using the FHWA STAMINA2/OPTIMA computer model published for use in a MS-DOS based personal computer system by Trinity Consultants. The barrier was configured such that it intercepted the line of sight between impacted residences and the road over an arc greater than 160 degrees F. This was to insure that traffic noise contributions from road segments beyond the barrier length would be negligible at receptor locations.

It should be noted that the proposed roadway alignments and the projected traffic volumes for Alternatives III and IV and for Alternatives III(a) and IV(a) are similar in the study area for the noise barrier.

In accordance with MDPW requirements, barrier heights were studied that provided a minimum 10 decibel reduction in sound at one or more of the impacted residences. In this case, impacted residences are those with estimated future traffic sound levels 15 dB or more above existing ambient peak hour equivalent sound levels (Table 4.13). Attached Table 4.14 indicates barrier insertion losses for the 7 impacted residences under each of the four Alternatives. From this Table, it can be seen that a 20 ft. high barrier (height above roadway surface) would be required for all Build Alternatives in order to provide the minimum 10 decibel average reduction at impacted locations. A barrier length of 2,790 ft. was used for all Alternatives.

As also required, a cost benefit analysis has been performed to evaluate barriers studied under each alternative. The cost benefit analysis has used the following criteria:

- Wall type barrier costs of $21 and $28 per sq. ft. were used for barrier heights below and above 20 feet from the roadway surface, respectively.

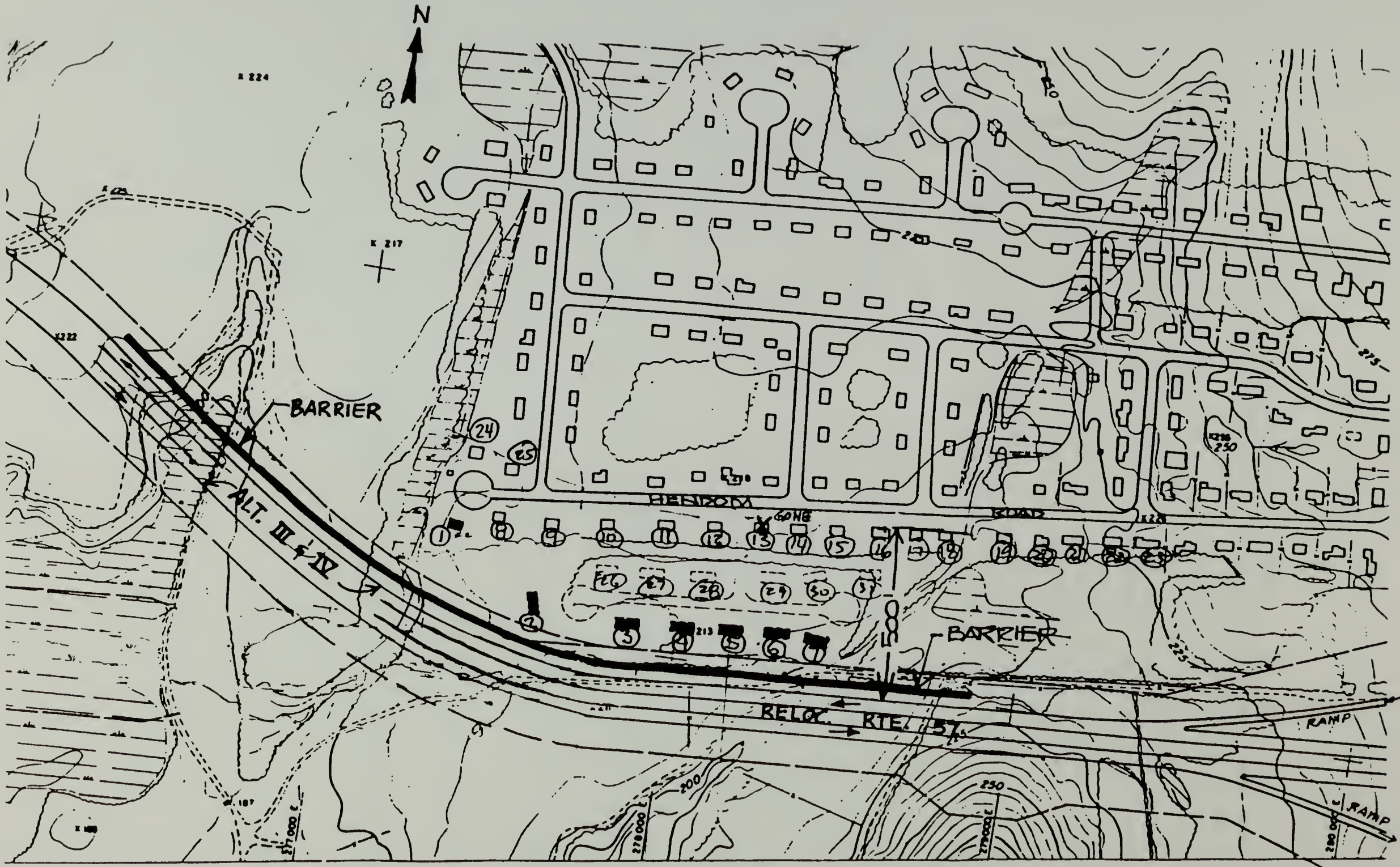
- Berm costs are assumed to be negligible because of excess materials on site.

- Barriers are considered feasible if the cost does not exceed $2,400.00 per average dBA reduction per residential unit.

- Residences to be included in this feasibility computation are those within 500 ft. of the road shoulder and receiving an insertion loss of 1 dBA or greater.

- In the barrier feasibility limit, the total decibel insertion loss is the sum of the insertion losses produced by the barrier at all residences within 500 ft. of the road shoulder.

Table 4.15 presents the cost benefit analysis and indicates that the barrier costs per average dB insertion loss per residential unit range from $5,040 to $5,480 for Alternatives III and IV and for Alternatives III(a) and IV(a) respectively. Since these estimates costs are well above the $2,400.00 per dB per residential unit cost indicated as a limit by MHD guidelines, a proposed noise barrier is not considered economically practical for the project.



NOTE:
- IMPACTED RESIDENCES SHOWN SHADED.
- RESIDENCES 2-7 AND 26-31 ARE EITHER NOT AS YET CONSTRUCTED OR NOT AS YET OCCUPIED BUT SOON TO BE COMPLETED.
- LOCATION 13 DOES NOT EXIST.

200 0 1000 FEET

CONTOUR INTERVAL 5 FEET

DATUM IS MEAN SEA LEVEL

FIGURE 4.1 NEW HENDON ROAD NEIGHBORHOOD BARRIERS

TABLE 4.13

Barrier Insertion Losses for Hendom Heights Residences
Within 500 Ft. of Road

Single Family Residences Within 500'	No. Units	Alternatives IIIa & IV(a) 20'	Alternatives III & IV 20'
1*	1	7.6	8.3
2*	1	11.4	12.1
3*	1	10.2	10.9
4*	1	9.7	10.4
5*	1	9.8	10.4
6*	1	9.6	10.3
7*	1	9.6	10.1
8	1	7.0	7.8
9	1	6.9	7.7
10	1	6.6	7.4
11	1	6.3	7.3
12	1	5.9	6.7
14	1	5.4	6.0
15	1	5.0	5.5
16	1	4.2	4.6
17	1	3.6	3.8
18	1	3.0	3.2
19	1	1.9	2.0
20	1	1.3	1.5
21	1	1.0	1.1
22	**	**	**
23	**	**	**
26	1	7.8	8.5
27	1	7.6	8.4
28	1	7.5	8.2
29	1	7.0	7.6
30	1	6.5	7.0
31	1	5.5	5.8
Totals	26 Units	167.9	182.6
Ave. dBA	-	6.46	7.02

* Impacted Residences

** Insertion Losses less then 1 dBA.

TABLE 4.14

Insertion Losses in dBA at Impacted Residences

Impacted Residence	Alt. III(a) & IV(a) Barrier Height 20′	Alt. III & IV Barrier Height 20′
1	7.1	8.3
2	11.4	12.1
3	10.2	10.9
4	9.7	10.4
5	9.8	10.4
6	9.6	10.3
7	9.6	10.1
Average	9.7	10.4

TABLE 4.15

NOISE BARRIER COST ANALYSIS

ALTERNATIVES III & IV
ALTERNATIVES III(a) & IV(a)
(BARRIER 20 ft. above ROADWAY SURFACE)

Length (ft.)	Height <20' @ $21 psf	Height> 20' @ $28 pfs	Total Height (ft.)	Total Area (SF)	Total Cost ($1000)
1200	10.5	0.0	10.5	12,600	$264.6
360	20.0	12.0	32.0	11,520	272.2
600	6.5	0.0	6.5	3,900	81.9
320	20.0	8.0	28.0	8,960	206.1
200	(Earth Berm Only)		0.0	0	0.0
110	20.0	16.0	36.0	3,960	95.5
			TOTALS	40,940	$920.3

COSTS/AVE. dBA (Alternatives III & IV)

= $920,300/7.02 Ave. dBA loss for 26 Residences

= $5,040±/Ave. dBA/Residence

COSTS/AVE. dBA (Alternatives III(a) & IV(a)

= $920,300/6.46 Ave. dBA loss for 26 Residences

= $5,480±/Ave. dBA/Residence

SECTION C

SOUND LEVEL MONITORING SYSTEMS

SOUND LEVEL MONITORING SYSTEMS

System 1

- GenRad Type 1961-9601 1" Electret-condenser microphone with windscreen
- GenRadType 1560-P42 microphone preamp
- Digital Acoustics 607P Community Noise Analyzer
- GenRad 1562-A sound level calibrator

System 2

- Bruel & Kjaer Type 4165 microphone and windscreen
- B & K Type microphone preamp
- B & K Type 2231 sound level meter
- Diconix Model 150
- B & K Type 4230 sound level calibrator

System 3

- Larson Davis Type M4 1/2" microphone with windscreen
- Larson Davis Type 784 microphone preamp
- Larson Davis Model 700 environmental sound monitor
- Larson David Type CA 250 calibrator
- Diconix Model 150 printer

The operation and specification for equipment in Systems 1 and 2 conform with American National Standard Institute S1.4 for Type 1 precision sound measurement instrumentation. Sound measurement equipment and methods associated with System 3 conform with ANSI Standard S1.4 for Type 2 sound level measurement instrumentation.

APPENDIX 5.

FARMLANDS

FARMLANDS

Farmlands that will be affected by the Build Alternatives have been analyzed in accordance with procedures established under the Farmlands Protection Policy Act (FPPA) by the U.S. Department of Agriculture, Soil Conservation Service (SCS). Form AD-1006: "Farmland Conversion Impact Rating," developed by the SCS, provides a means of quantifying the impact of a project on farmlands. The procedures as outlined in the manual entitled: "STEPS FOR COMPLIANCE WITH THE FARMLANDS PROTECTION POLICY ACT FOR CORRIDOR PROJECTS," prepared by the Massachusetts Department of Public Works, July 12, 1985, were used to complete Form AD-1006 for Alternatives III and IV of the Relocation of Route 57.

FORM AD-1006, PART III

Land to be Converted Directly

The land to be converted directly by Alternatives III and IV of the Phase II Relocation of Route 57 is defined as the area of the the right of way. The lengths and areas of the alternatives, from the beginning in Southwick east) to South Westfield Street are as follows:

ALT.	LENGTH	WIDTH	AREA
III	10,840'	300'	74.6 Ac
IV	11,470'	300'	79.0 Ac

Land to be Converted Indirectly

Boglisch Tree Farm - Alternative III

Farmable land was identified from existing 200 scale topographic maps based on the location of farm roads, wetland edges, edge of woods limits, and contours. The areas of the farmable land north and south of the right of way limits were planimetered. The northern parcel contains approximately 26 acres of farmable land while the southern parcel contains approximately 18 acres of farmable land. Although the main access road to the tree farm from South West Street will be eliminated by this alternative, access to the northern parcel will be possible by means of a path to the west of the existing frontage lots on South West Street. The path, which does not cross wetlands, could be improved to provide appropriate access.

Existing maps show a farm road which might provide access to the southern parcel. This road runs westerly from South West Street, through a wetland for a substantial portion of its length before it enters the farmable portion of this parcel. It is doubtful that this road could be improved to provide the required access. Based on the existing property line configurations, the southern portion of the Boglisch property that is farmable will be converted indirectly by the construction of Alternative III.

Boglisch Tree Farm - Alternative IV

The only portion of the farmable land which will be converted indirectly by this alternative is near the northwesterly corner of the property at the base of Provin Mountain. The area of the parcel, by planimeter, is approximately one (1) acre.

Tuckahoe Turf Farm

Farmable land northeast of both alternatives has no alternate access, based on plotted property lines. Methods similar to those used for the Boglisch property were used to define and measure the area of the farmable property. The area of farmable land to be converted indirectly for Alternative III is 35 acres. This area for Alternative IV is 32 acres.

Schmaelzle Farm

Both alternatives abut the northwesterly line of the Schmaelzle property, and no portion of this farm will be converted indirectly.

FORM AD-1006, PART IV

The following are the procedures that were used in completing Form AD-1006, Part IV, Site Assessment Criteria 1 thru 12, inclusive:

1. Area in Non-Urban Use

The most recent copy (1979 photo update) of the West Springfield Quadrangle, enlarged to a scale of 1"=1000', was used to display the area within one mile of the proposed alternatives. Recent topographic maps which covered only portions of the analysis area were used to update the USGS map to reflect recent construction and to provide the best available basis for analysis.

Those areas that have been built on or paved in order to be used were outlined on the updated copy of the USGS map. The acreage of these "urban" areas was then tabulated by alternative. These values and the computed area of property within one (1) mile of the project alternatives were used to determine the percentage of land in non-urban use. These percentages and the "assessment scale" were then used to determine the point assessment.

2. Perimeter in Non-Urban Use

The mapping used in item (1.) was used to determine the percentage of the perimeter of the site that borders the non-urban land use. This percentage was used with the "assessment scale" to determine the point assessment.

3. Percentage of Site Being Farmed

The area of the sites for Alternatives III and IV, the area within the right of way and in the indirectly converted land, used for farming was determined from existing mapping. The number of acres within each site that is actually farmed was then expressed as a percentage of the total site area as reported in Part III of Form AD-1006. These percentages and the "assessment scale" were used to determine the point assessment.

4. Protection Provided by State and Local Government

Farms in the project area can have up to three (3) types of protection: Chapter 61A, Chapter 61, and APR. The Boglisch Tree Farm, which has three (3) types of protection available, utilizes two (2) types:

1) Chapter 61A
2) Chapter 61

The Tuckahoe Turf Farm, which has two (2) types of protection, utilizes one (1) type:

1) Chapter 61A

The Schmaelzle Farm has no type of protection available.

The total acres of farmland protected, as developed in item (3.), is 79 and 63 for Alternatives III and IV, respectively. The percentage of protected farmland in each site (Alternatives III and IV) will be adjusted by 58% ((2/3 + 1/2)/2) to reflect this under-utilization of "protection".

7. Size of Present Farm Unit Compared to Average

The Boglisch Tree Farm has approximately 54 acres of farmable land. It is estimated from available maps that the Tuckahoe Turf Farm contains approximately 80 acres of farmable land. The Schmaelzle Farm contains approximately 50 acres. The average area of the farmable land in these three sites is 61 acres. The average farm unit in Hampden County in 1987 was 95 acres. Hence the average farm unit for the alternatives considered is 36% below the average size of the unit in Hampden County.

8. Creation of Non-Farmable Land

The factors needed for analysis are the "acres converted directly" and the "acres converted indirectly". These values are taken directly from Part III of Form AD-1006.

9. Availability of Farm Support Services

Based on documentation from Boglisch and Tuckahoe letters, complaints, etc., services and markets are available for their products.

10. On-Farm Investments

The three farms which are affected by these alternatives range from high on-farm investments in the case of Tuckahoe (irrigation, harvesting equipment, etc.) to moderate to low investment for the Schmaelzle Farm.

Tuckahoe	10 Points
Boglisch	20 Points
Schmaelzle	3 Points

Average 33/3 = 11 Points

11. Effects of Conversion on Farm Support Services

The "ASSESSMENT OF AGRICULTURAL ACTIVITIES ON CROPLAND IN MASSACHUSETTS" (UMASS, June 1986) reported approximately 2,100 acres of cropland in Agawam in 1986. The conversion of, at most, 128 acres of this croplands (approximately 6%) would result in minimal reduction in the demand for support services. Since the worst case - the conversion of ALL cropland in Agawam - is worth 25 points, these alternatives would result in:

Alternative III	128/2,100 x 25, say 2 Points
Alternative IV	112/2,100 x 25, say 1 Point

12. Compatibility with Existing Agricultural Use

There is little possibility that either Alternative III or IV will have any negative impact on the farmland in Agawam. Since this project is the relocation of an existing route, and the distance between the existing and proposed routes is less than one mile, there will be no further conversion of surrounding farmland due to this relocated route.

STORCH ENGINEERS

1616 SOLDIERS FIELD ROAD
BOSTON MASSACHUSETTS 02135
1-617-783-0404

July 12, 1990

Richard J. DeVergilio
District Conservationist
U.S. Soil Conservation Service
4 Whalley Street
Hadley, MA 01035

Re: Route 57 Relocation
Agawam/Southwick, MA

Dear Mr. DeVergilio:

Enclosed is Form AD-1006 and a location map for the referenced project. These data are being sent to you as part of our contract with the Massachusetts Department of Public Works for the relocation of Route 57.

Your office has previously evaluated this project for alternative alignments II and III. Subsequent to your original evaluation, dated June 22, 1989, alternative II was dropped from further consideration, and alternative IV was identified. In the process of preparing the enclosed Form AD-1006, certain inconsistencies were identified in the "total acres" reported for alternative III on our 1989 submission. We are, therefore, submitting both alternatives III and IV for your review and evaluation.

Please note that we have identified alternative III as Site B, and alternative IV as Site C. Although alternative II, which was submitted as Site A on our 1989 form, has been dropped from further consideration, we felt that it was appropriate to maintain a unique identification for each alternative on Form AD-1006.

Should you have any questions regarding this submission, please contact the undersigned.

Very truly yours,

STORCH ENGINEERS

Richard E. Danielson

Richard E. Danielson

RED/MMD
066470
Enclosures

UNITED STATES
DEPARTMENT OF
AGRICULTURE

SOIL
CONSERVATION
SERVICE

243 King Street
Northampton, MA 01060
Tel: 413 586-5440

Date:July 18, 1990

Storch Engineers
Richard E. Danielson
1616 Soldiers Field Road
Boston, MA 02135

Dear Mr. Danielson:

In response to your request of July 12th, enclosed are copies A and B of the completed Ad-1006, Farmland Conversion Impact Rating regarding the Rte. 57 Relocation Project in Agawam and Southwick, MA.

Please see that the requesting federal agency (FHWA) receives both copies.

Sincerely,

Richard J. DeVergilio
District Conservationist

JUL 13 1990

U.S. Department of Agriculture

FARMLAND CONVERSION IMPACT RATING

PART I *(To be completed by Federal Agency)*	Date Of Land Evaluation Request: July 10, 1990
Name Of Project: Route 57 Relocation - Agawam, MA	Federal Agency Involved: FHWA
Proposed Land Use: Highway	County And State: Hampden County, MA
PART II *(To be completed by SCS)*	Date Request Received By SCS:

Does the site contain prime, unique, statewide or local important farmland? (*If no, the FPPA does not apply – do not complete additional parts of this form).* Yes ☒ No ☐

Acres Irrigated: –

Average Farm Size: 118

Major Crop(s): SILAGE CORN, HAY, TRUCK CROPS, NURSERY, TURF

Farmable Land In Govt. Jurisdiction: Acres: 90,062 % 46

Amount Of Farmland As Defined in FPPA: Acres: 73,020 % 38

Name Of Land Evaluation System Used: HAMPDEN CNTY, CENTRAL PART

Name Of Local Site Assessment System: –

Date Land Evaluation Returned By SCS:

PART III *(To be completed by Federal Agency)*	Alternative Site Rating Site A	Site B Alt III	Site C Alt IV	Site D
A. Total Acres To Be Converted Directly		75	79	
B. Total Acres To Be Converted Indirectly		53	33	
C. Total Acres In Site		128	112	
PART IV *(To be completed by SCS)* Land Evaluation Information				
A. Total Acres Prime And Unique Farmland		35	[redacted]44.5	
B. Total Acres Statewide And Local Important Farmland		1	2	
C. Percentage Of Farmland In County Or Local Govt. Unit To Be Converted		.001	.001	
D. Percentage Of Farmland In Govt. Jurisdiction With Same Or Higher Relative Value				
PART V *(To be completed by SCS)* Land Evaluation Criterion Relative Value Of Farmland To Be Converted *(Scale of 0 to 100 Points)*		76	80	

PART VI *(To be completed by Federal Agency)* Site Assessment Criteria *(These criteria are explained in 7 CFR 658.5(b)*	Maximum Points				
1. Area In Nonurban Use	15		12	12	
2. Perimeter In Nonurban Use	10		8	8	
3. Percent Of Site Being Farmed	20		13	12	
4. Protection Provided By State And Local Government	20		7	6	
5. Distance From Urban Builtup Area	n/a		--	--	
6. Distance To Urban Support Services	n/a		--	--	
7. Size Of Present Farm Unit Compared To Average	10		4	4	
8. Creation Of Nonfarmable Farmland	25		25	25	
9. Availability Of Farm Support Services	5		5	5	
10. On-Farm Investments	20		11	11	
11. Effects Of Conversion On Farm Support Services	25		2	1	
12. Compatibility With Existing Agricultural Use	10		0	0	
TOTAL SITE ASSESSMENT POINTS	160		87	84	
PART VII *(To be completed by Federal Agency)*					
Relative Value Of Farmland *(From Part V)*	100		76	80	
Total Site Assessment *(From Part VI above or a local site assessment)*	160		87	84	
TOTAL POINTS *(Total of above 2 lines)*	260		163	164	

Site Selected: | Date Of Selection | Was A Local Site Assessment Used? Yes ☐ No ☐

Reason For Selection

(See Instructions on reverse side)

Form AD-1006 (10-83)

APPENDIX 6.

HISTORICAL AND ARCHAEOLOGICAL

July 21, 1989

Robert Johnson
Chief Engineer
Massachusetts Department of Public Works
10 Park Plaza, Room 4182
Boston, MA 02116
ATTN: John Rempelakis

RE: Route 57, Agawam and Southwick (EOEA #915)

Dear Mr. Johnson:

Staff of the Massachusetts Historical Commission have reviewed the report, "Archaeological Site Location Survey at the Site of the Route 57 Relocation Project, Agawam and Southwick, Massachusetts," prepared by the University of Massachusetts Archaeological Services.

Three prehistoric archaeological site loci were identified during the intensive (locational) archaeological survey: Survey Units 2, 3 and 5. Since the archaeological site located in Survey Unit 2 is outside (south) of the present project area, and no impacts are anticipated, no further work is recommended. In Survey Unit 3, the "Spear Cornfield Site" was identified through diagnostic projectile points, lithic debitage and fire-cracked rock. The "Boglish Site," located in Survey Unit 5, yielded an edge tool (scraper) and lithic debitage. These sites have the potential to contribute significant information about the prehistory of the Connecticut River Valley lowlands. The MHC requests that an Archaeological Site Examination (950 CMR 70) be conducted at the two sites located in Survey Units 3 and 5. The purpose of the Site Examination is to determine the spatial limits of the sites, internal configuration, and whether the sites are eligible for inclusion in the National Register of Historic Places. Staff of the Massachusetts Historical Commission are willing to assist project proponents in developing an appropriate scope for the archaeological study.

These comments are offered in compliance with Section 106 of the National Historic Preservation Act of 1966, as amended (36 CFR Part 800). If you have any questions, please contact Ed Bell of my staff.

Sincerely,

Brona Simon

Brona Simon
Deputy State Historic Preservation Officer
State Archaeologist
Director, Technical Services Department
Massachusetts Historical Commission

cc: Gregory P. Heath, Storch Engineers
Mitchell T. Mulholland, University of Massachusetts Archaeological Services

BS/as

April 26, 1991

Anthony J. Fusco
Federal Highway Administration
55 Broadway, 10th Floor
Cambridge, MA 02142

RE: Route 57 Relocation Project, Agawam & Southwick, MA. EOEA #915.

Dear Mr. Fusco:

Staff of the Massachusetts Historical Commission have reviewed the information you submitted on the archaeological investigations conducted in the project area referenced above by UMass Archaeological Services, received by the MHC on April 18, 1991.

The report, "Archaeological Site Locational Survey at the Site of Alternative IV of the Route 57 Relocation Project, Agawam and Southwick, Massachusetts," indicates that the majority of the project area has been previously impacted. The single prehistoric artifact recovered, a Small Stemmed projectile point, is an isolated discovery, and is not considered to be eligible for inclusion in the National Register of Historic Places.

The results of the "Archaeological Site Examination of the Boglisch Site, Agawam, Massachusetts," indicates that the prehistoric archaeological site has been considerably impacted from agricultural activities. While the low density of materials indicate that the site was likely a small, short-term camp occupied in the Late Archaic and/or Woodland Periods, MHC does not consider the Boglisch Site (19-HD-194) to be eligible for listing on the National Register of Historic Places because it lacks sufficient integrity to meet the National Register eligibility criteria (36 CFR 60).

MHC understands that Alternative II is no longer being considered, so that the Spear's Cornfield Site (19-HD-192) and the Spear's Pepper Field Site (19-HD-193), located within and adjacent to this alternative route, will not be impacted. Should any modifications to project design be proposed in the vicinity of these sites, MHC should be consulted early in the planning design stage.

It has come to the attention of the MHC that some amount of earth fill will be

required for this project, likely resulting in the creation of borrow pits. MHC requests the opportunity to review the proposed road fill source locations to determine whether or not the proposed excavation activities are likely to affect any properties listed or eligible for listing on the National Register of Historic Places.

These comments are offered to assist in compliance with Section 106 of the National Historic Preservation Act of 1966 as amended (36 CFR 800). Should you have any questions or require further assistance, please feel free to contact Edward L. Bell of my staff.

Sincerely,

Brona Simon

Brona Simon
State Archaeologist
Deputy State Historic Preservation Officer
Massachusetts Historical Commission

cc: Mitchell T. Mulholland, UMAS
George Turner, MDPW
Marie Bourassa, USACOE
Secretary Susan F. Tierney, EOEA/MEPA